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Recognizing and solving land use problems; a case study: The Highwood Bench Alkali Control Association

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RECOGNIZING AND SOLVING LAND USE PROBLEMS

--A CASE STUDY--

THE HIGHWOOD BENCH ALKALI CONTROL ASSOCIATION

by

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CHAPTER I

INTRODUCTION

Those who manage land, water, and plant resources find themselves continually facing problems. Some of these by virtue of being simple, repetitious, or limited in area can be solved by the individual manager. Others are more complex. Their nature is frequently not fully understood. The total control of all the factors causing the problem may not be with one or even a few managers. In such a case the most effective, if not the only way to get at the cause and correct it, is through a societal relationship between people. Such a relationship should be one where mutual concern and trust develops, ideas are exchanged and cooperation between the several parties leads to a mutual effort to solve the problem.

Frequently such relationships are simply "neighboring." On other occasions an informal community arrangement is effective. Occasionally the nature of the problem is such that a formal legal association is needed. This paper discusses such a land resource-management problem and the kind of organization that evolved over time which contributed to solution.

For several years, features of soil and geology, precipitation and cropping systems combined to cause deteriorating conditions on some of the nonirrigated croplands over wide areas of the United States and Canada. Historically resulting problems have been treated on a piecemeal

or individual farm basis. As the seriousness and complex nature of such problems was recognized more systematic approaches developed to cope with such problems area-wide.

The phenomenon under consideration in this paper has acquired several names. Years ago the "Montana Farmer-Stockman" magazine called it "North slope alkali." Other identifying terms are "alkali spots," "alkali seeps," "saline seeps," "seeps," "seeped saline spots," and there are perhaps other local names. We will use the above names interchangeably.

An effort will be made to describe the alkali problem and the conditions from which it results. Early recognition of the spread of such "seeps" and attempts at correction will be discussed. The continual growth of the problem to the current situation will be presented.

Cooperative efforts of certain local, state, and federal agencies have been developed to help farmers treat alkali problems. One such organization, the Highwood Bench Alkali Control Association, was organized for the sole purpose of solving the alkali problem in a given area. The history behind the formation of this group, the first such district in Montana, is developed.

Our purpose in presenting this study is finally an evaluation of the formation of a special district for problem solving. This includes the effectiveness of the special district and multi-agency approach as compared to individual farmer and single agency effort. Where several federal and state agencies work together on such a project as this, conflicts between them occasionally arise. This can occur because of differences in agency objectives or because of personnel conflicts

within and between agencies. Two areas of conflict relating to this case are discussed.

CHAPTER II

DESCRIPTION OF THE ALKALI PROBLEM

Visual Effect On The Landscape

In the last ten to twenty years much of the glacial area of the northern Great Plains developed a feature not commonly seen there before. During the high evaporation period of the summer months many areas of the landscape become marked with what appears to be scattered patches of snow. The white coloring results from an accumulation of various kinds of salts deposited on the land surface as the moisture which carried the salts upward evaporated. In fall, winter, and spring, when evaporation is slight and the ground surface is wet, these areas have the typical dark coloring of summerfallow, where they are void of vegetation. Or they have the colors of Russian Thistle, Kochia or other vegetation where salt concentrations are not so high as to preclude these salt tolerant species from growing.

Though scattered somewhat over the landscape the spots are most commonly found on the lower slopes and concave areas along drainageways. Their size will range from a few feet in diameter to many acres.

Besides being salty these areas are also wet. In addition to the production loss on this land, a farmer has the added risk and inconvenience of getting his equipment stuck should he venture too close.

Where the common practice of alternate years of cropping and then fallowing is followed, these spots enlarge approximately 10 percent.

each year. New saline seeps frequently begin as a damp spot a few feet across. Over the course of a season or two they will enlarge, becoming both wetter and more salty until only salt tolerant species will grow on them. Left unchecked the areas will progress to the point where salt concentrations preclude any plant growth. Not infrequently water will actually exude from the soil surface. Figure 1 shows an example of this.

In figure 2 we show an area near the north end of the Highwood Bench as seen from the air. Some idea of scale can be determined from the vehicles parked on the roadway. The irregular shape, white appearance and variation in size of the affected areas are typical visual aspects of the problem.

Potential Problem Areas

Geological conditions favorable for development of the alkali problem we are considering exist over a large area of the northern plains states and the praire provinces of Canada. At an interagency meeting in Bozeman, Montana on January 10, 1969, Fred Booth, a Highwood Bench farmer, reported on Canadian experiments with continuous cropping to help solve alkali problems.[1] During a field trip in the Highwood Bench area in 1969, Albert Grable, Soil Scientist with ARS, reported the alkali problem was known to exist in Montana, North and South Dakota and Canada.[2]

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[1]Minutes of TAP Salinity Meeting, Bozeman, Montana, January 10, 1969.

[2]Minutes of Meeting and Field Trip, Chouteau County, April 17-18, 1969, by Herman Kraus, Area Conservationist, SCS, Great Falls, Montana.

Figure 1 (Paul Brown Photo)
Close-up view of a saline seep area. Water is flowing on the surface and some salt tolerant vegetation is growing. In center of photo casing of test well, in which periodic water level measurements are made, shows above ground.

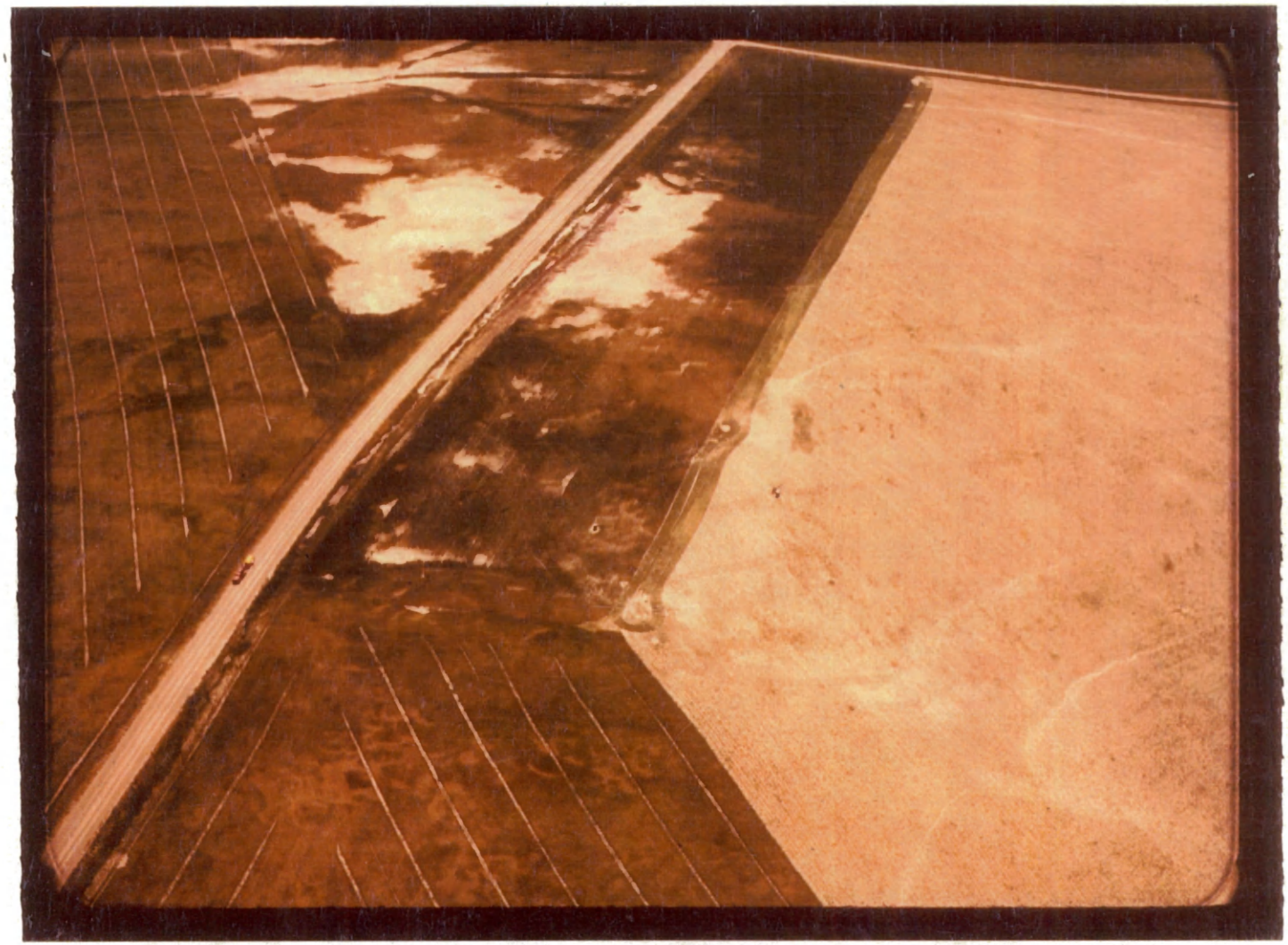

Figure 2 Marvin Miller Photo
Aerial view of part of Highwood Bench showing saline seeps (white areas) and on the left grass wind barriers at forty-eight foot spacing. One of the test well areas for the project is in the center of the picture.

Marvin R. Miller, Hydrogeologist with the Montana Bureau of Mines and Geology, identified potentially hazardous areas in a paper presented at a workshop in Great Falls in 1971. Miller's explanation states that the presence of thick sequences of black marine shale of late Cretateous age overlain by a mantle of glacial till constitutes the hazardous criteria. These conditions exist over 12,500 square miles of Montana, 17,000 square miles of North Dakota, 28,000 square miles of South Dakota, 7,000 square miles of Alberta, 50,000 square miles of Saskatchewan and 13,000 square miles of Manitoba.[3] The total area susceptable to the problem, according to Miller, is about 128,000 square miles.

Aerial Extent

In Montana

Over the past several years attempts have been made to determine the actual land area affected in Montana. However, since the kind of seepage problem considered here is only one of several types that occur, and since the "problem" acreage is constantly changing and developing, an accurate measure of the total size is difficult to determine. A survey made in 1969 by Clair Clark, Soil Scientist with the Soil Conservation Service in Great Falls, put the damaged acreage at 55,700

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[3]Marvin R. Miller, "Hydrogeology of Saline-Seep Spots in Dryland Farm Areas--A Preliminary Evaluation," in Proceedings--Saline Seep-Fallow Workshop, Highwood Bench Alkali Control Association, Highwood, Montana. (1971), p. 5.

acres in nineteen counties.[4]

The problem had increased significantly by 1971. Speaking at the Saline Seep-Fallow Workshop in Great Falls, Clark reported a 1971 estimate of 81,430 acres in twenty five counties. Many people working closely with the problem believe these are conservative estimates.

In Chouteau County

Since our paper deals with the alkali problem in the Highwood Bench area of Chouteau County, we take particular note of the extent of the problem in that locality. In 1969 Chouteau County reported 9,000 affected acres.[5] Oscar Pederson, District Conservationist, Ft. Benton, estimates for 1971, 10,000 acres.[6]

Growth Over Time

Earlier we noted the tendency for alkali spots to enlarge over time. Figure 3 illustrates an actual case. Reproductions of ASCS aerial photos indicating official acreage figures to the farmer are presented. In 1930 the entire field was reported as cropland. Since 1930 the problem developed.

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[4]Leland Cade, "Summer Fallow Has To Go," Montana Farmer-Stockman, (July 3, 1969), p. 9.

[5]Ibid.

[6]Oscar Pederson, personal letter, January 4, 1972.

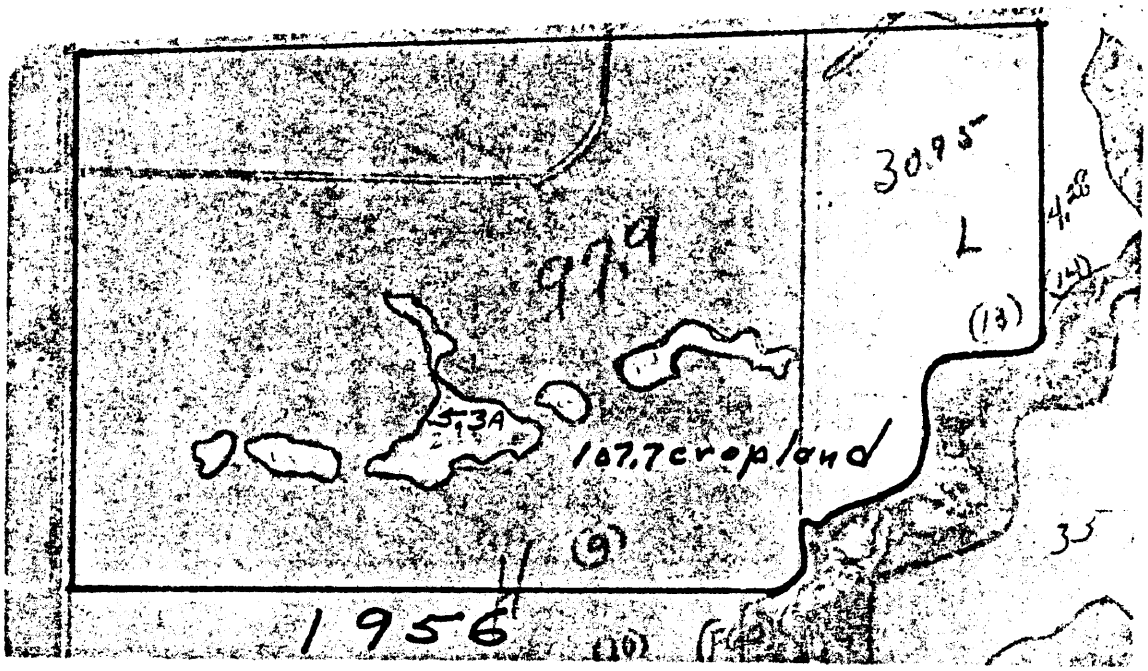

Figure 3 (Continued on next page)

Reproductions of Agricultural Stabilization and Conservation Service aerial maps of the same field showing the alkali and cropland acreage for 1956, 1966 and 1969.

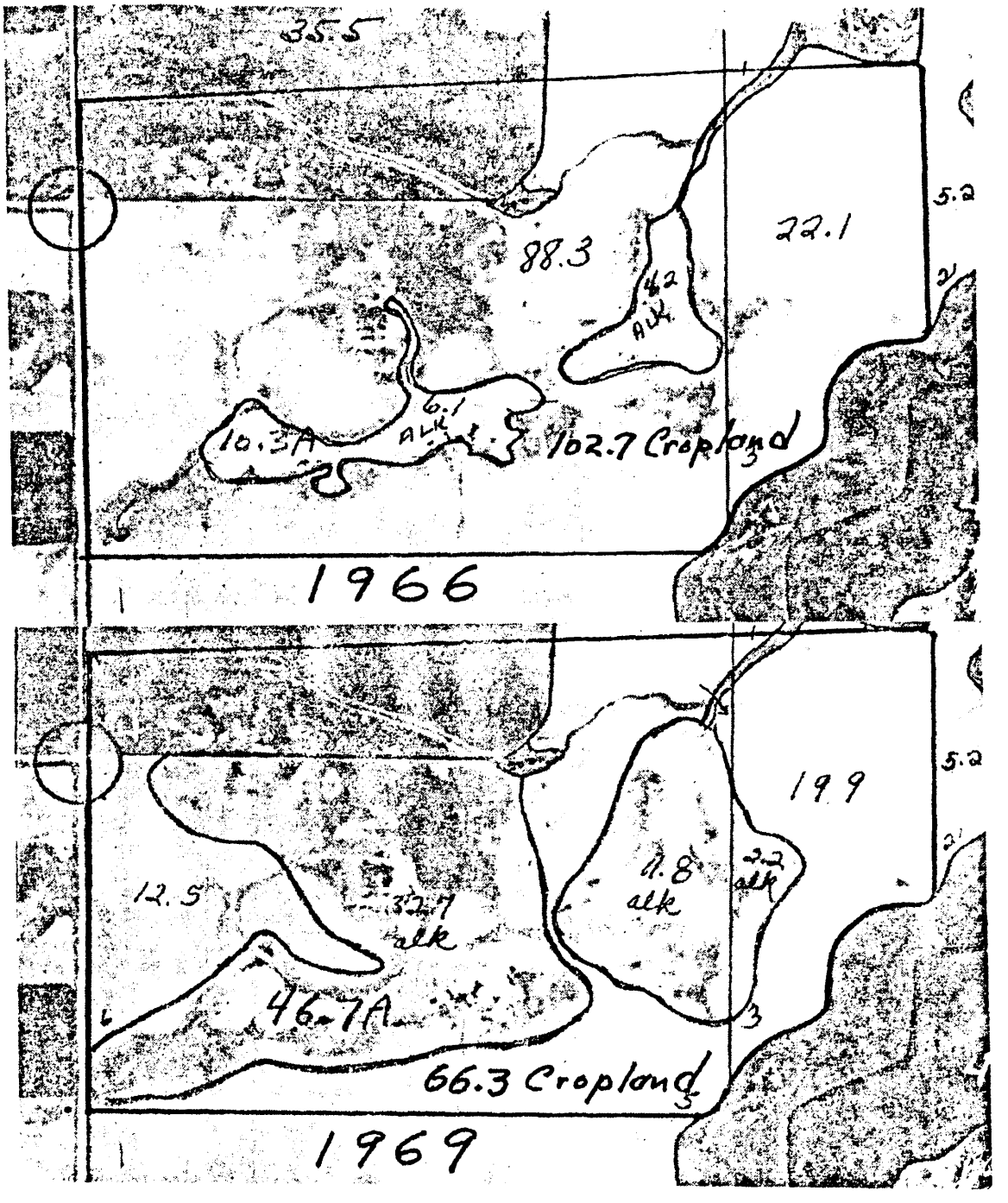

Figure 3 (continuation)

	1930	1956	1966	1969
Cropland acres	113	107.7	102.2	66.3
Alkali acres	0	5.3	10.3	46.7

The alkali acres increased approximately 41 percent over the 39 year period. In 1971 the affected areas were enlarging at a rate in excess of 10 percent each year.[7]

The rate of growth of the affected area is closely correlated to the annual rainfall. The large increase in alkali acres from 1966 to 1969 no doubt results in part from the above average rainfall over that period. (See Table 1, page 13).

Figure 4 clearly shows the encroachment of the alkali areas into adjacent farmland. Notice the spread of the salt into the seeded area. When this field of winter wheat was seeded the previous fall the wet, salty portion was confined to the area covered by the old weed growth. Machinery could easily work right up to this line. By early summer the year the picture was taken the situation had changed considerably.

Economic Impact

To get some idea of the economic impact of the alkali problem a simple example is given for Chouteau County. In 1971 land sold at about $200.00 per acre. Yields in the county for winter wheat on fallow run about 40 bushels per acre.[8] The 10,000 acre alkali figure previously noted therefore represents $2,000,000 in lost land. Assuming a yield

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[7]Miller, op. cit., p. 1.

[8]Oscar Pederson, personal letter,

TOTAL PRECIPITATION

Year	Highwood 7NE	Highwood	Shonkin 7S
1951	19.97	-	-
1952	8.14	-	-
1953	21.76	-	-
1954	19.41	16.81	32.54
1955	16.07	15.08	24.05
1956	10.01	-	14.11
1957	14.12	15.93	27.27
1958	15.43	15.60	25.05
1959	15.94	18.01	32.42
1960	11.74	10.24	19.52
Average Ten Years	15.26	15.28	24.99
1961	10.20	10.77	21.66
1962	17.84	19.59	33.07
1963	11.70	12.67	20.41
1964	22.20	23.58	42.62
1965	20.66	22.92	34.09
1966	15.75	16.63	29.63
1967	19.52	21.40	36.65
1968	20.47	19.06	36.30
1969	17.03	15.16	24.43
1970	20.02	18.99	34.95
Average Ten Years	17.54	18.08	31.38
Average Twenty Years	16.40	16.68	28.19

Table 1. Precipitation data for three stations in the Highwood Bench area. (From National Weather Service Climatological Data)

Figure 4 (Paul Brown Photo)
View of field of winter wheat field showing encroachment of saline seep into area which at seeding time was not affected to the point that machinery could not operate.

of 20 bushels per acre on an annual basis over the 10,000 acres this represents a yearly loss in income of about $240,000. There are other economic hardships involved such as down time from getting stuck with equipment, time spent working around odd shaped spots, realigning fields for acreage compliance and the reduced value of land in that part of the county where the problem is spreading. Our dollar illustration only illustrates the considerable money loss occurring from the problem. Other losses to the farmer and the community also occur.

CHAPTER III

GEOLOGY AND SOIL CONDITIONS

Surface Land Forms

Glaciated land forms possess peculiar characteristics readily discernable to the trained eye. These characteristics include local relief, slope features and drainage patterns. In Montana the variety of continental glacial relief can be expressed as ranging from high relief, choppy, moranic, kettle hole topography to smooth, nearly level, outwash meltwater deposits. In the former case, typified by the landscapes of northeastern Sheridan County and extreme northern Blaine and Phillips counties, local relief will range from 100 to 200 feet with the distance between crests being perhaps 300-400 feet. In contrast the smooth outwash topography has very low relief, measured in tenths of a foot, with expanses of several hundred yards between crests. Typical of this type of topography is the smooth broad areas of southern Liberty County and southwestern Hill County.

The Highwood Bench topography lies between these two extremes. Relief is moderate with few short or steep slopes other than in entrenched drainageways. Local relief generally is on the order of under one hundred feet. In soil scientist objective terms it is described as undulating to rolling. Long slopes of 2 to 8 percent gradient are common. Figure 5 shows a typical area with contour lines at

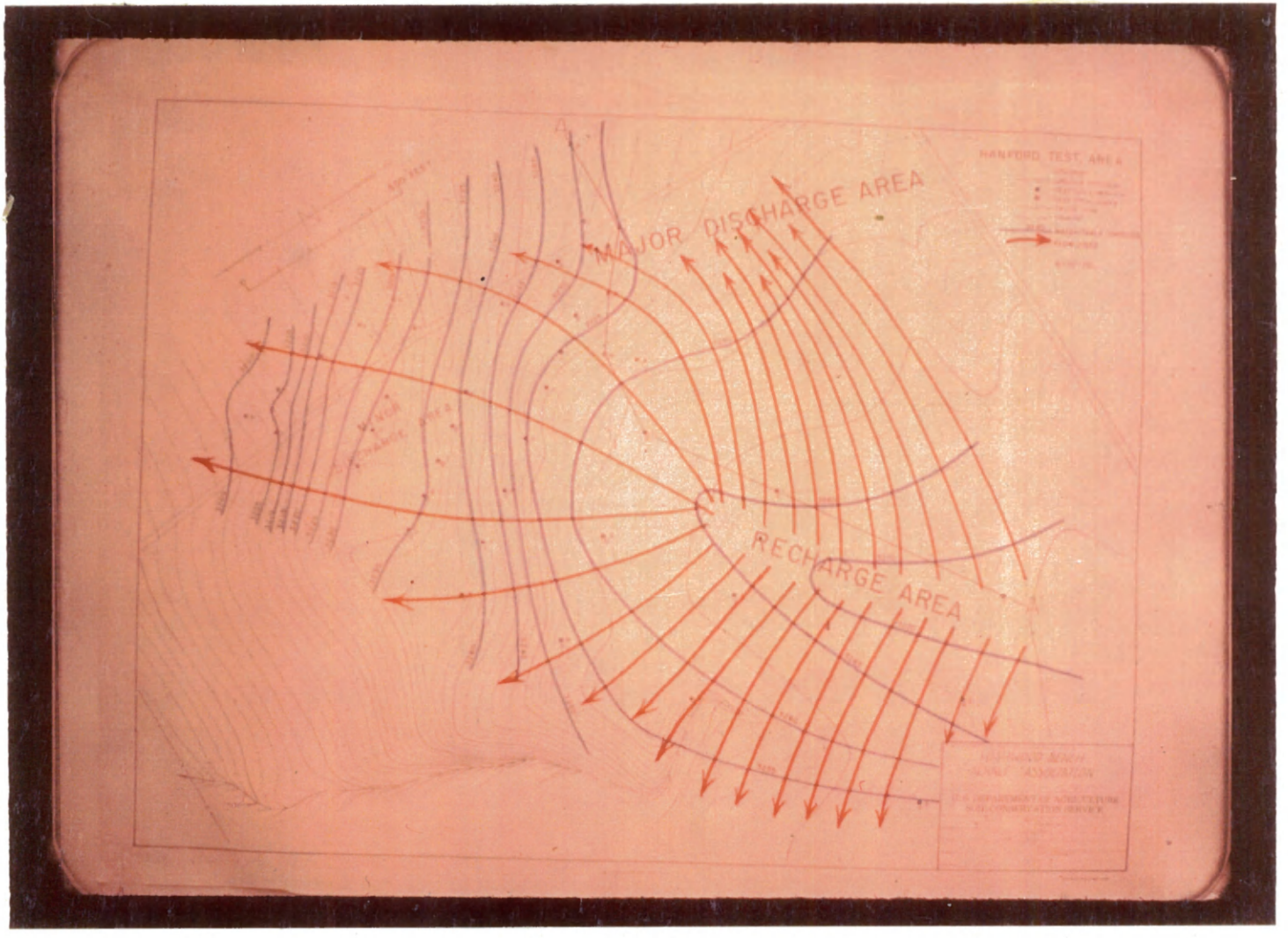

Figure 5 (Marvin Miller Photo)
Map of test well area showing ground surface contours, water table contours, and water flow lines.

two foot vertical intervals indicated.

Surface textures are usually in the clay loam range. Where the till is derived from silty or sandy bedrock formations the texture will be loamy rather than clay loam. In the Highwood area the underlying bedrock is dark, fine textured marine shale of the Colorado group. As a result the surface textures are predominately clay loam.

Internal Soil and Geologic Features

The physical internal soil and geologic features most directly relating to the alkali problem are texture, thickness, premeability and mineral content of the till overburden and upper shale layers. To determine the character of the glacial mantle and underlying bedrock a series of carefully logged test wells have been drilled at selected locations on the bench. Part of the area covered by Figure 5 has been explored in this fashion. The information for the lines in this illustration, depicting ground water elevations, were obtained from the test wells.

The till mantle is of two different ages. In part of the area the older, darker colored mantle is missing and the younger, light colored till rests directly on the shale. The combination of these two ages of till will vary in thickness from a few feet to sixty feet over the shale. A few lenses of sandy material and several gravel beds (old temporary glacial channels of the ancestral Missouri River) are found

lying beneath, within or on top of the glacial till.[1]

Below two or three feet the till material is loaded with salt crystals. These are usually a mixture of the chloride, sulfate or bicarbonate salts of calcium, magnesium and sodium. Where the percent of sodium salts is high there is a special problem in addition to salinity. Certain chemical compounds of sodium cause the soil structure to break down and the soil particles to disperse. They also break down organic matter and cause the condition known as "black alkali." Problems associated with high sodium are especially troublesome to correct.[2]

Effect On Drainage

External

A rather complete net of drainageways provide good surface drainage on the Highwood Bench. There are few areas where enclosed basins cause local ponding of surface water. Many of the drainage channels have dams constructed in them which check the water in reservoirs. Where the water in these reservoirs comes primarily from surface runoff it is of good quality. Where a substantial amount comes from underground seeps it contains significant amounts of salts previously mentioned.

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[1]Marvin R. Miller, "Hydrogeology of Saline-Seep Spots in Dryland Farm Areas--A Preliminary Evaluation," in Proceedings--Saline Seep-Fallow Workshop, (1971), p. 2.

[2]Wendell Thacker, "The Relative Tolerance Of Forage and Field Crops To Salt," in Proceedings--Saline Seep-Fallow Workshop, (1971), p. 1.

Internal

The texture (expressed as a percent of clay, silt and sand) of both the bedrock Colorado shale and the matrix of the older till mantle seriously restricts internal water movement. The younger till, though still restrictive, is not so much so as the older layers. As a consequence, water movement laterally through the land form is generally confined to the contact between the younger and the older till; the contact between the till and shale bedrock; or the sandy lenses or gravel beds mentioned earlier. Seeps form where these features outcrop or come near the surface. They also occur where the water table, by virtue of its having built up in the soil, comes near the surface. Miller says, "Preliminary information suggests that when the water table rises to within three feet of the ground surface, the salts start to accumulate." Regarding the chance for effective internal drainage, Miller adds,

> X-ray analysis of the clay minerals in the glacial till indicate 80 percent montmorillonite (highly plastic sodium-rich expandable clay), 15 percent illite, and 5 percent kaolinite or chlorite. The high montmorillonite content may severely hinder the chances of effectively draining the saline areas.[3]

The location of the contact between the two ages of till or with the till and shale bedrock cannot be predicated from the present surface topography. Erosion patterns on the earlier land forms may have been different than the present surface. As a result the shale may be

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[3]Miller, op. cit., pp. 2-3.

near the surface on the ridges and deep in the coulees or vice versa.[4] Only by drilling can the subsurface features and water table level be determined.

Figure 6 shows a simple schematic illustrating the features and process involved in the formation of seeped areas. This illustration is used here for two reasons. First, it is useful in understanding the problem and, second, it is a photograph of a visual aid prepared by the Highwood Bench Alkali Control Association and used in their educational efforts with farmers and agency people and thus gives an insight into one phase of their activity.

[4]"Report On Wet And Saline Areas On Highwood Bench," Chouteau County, Montana. A report prepared in 1955 by Soil Conservation Service personnel, Soil Conservation Service, Bozeman, Montana.

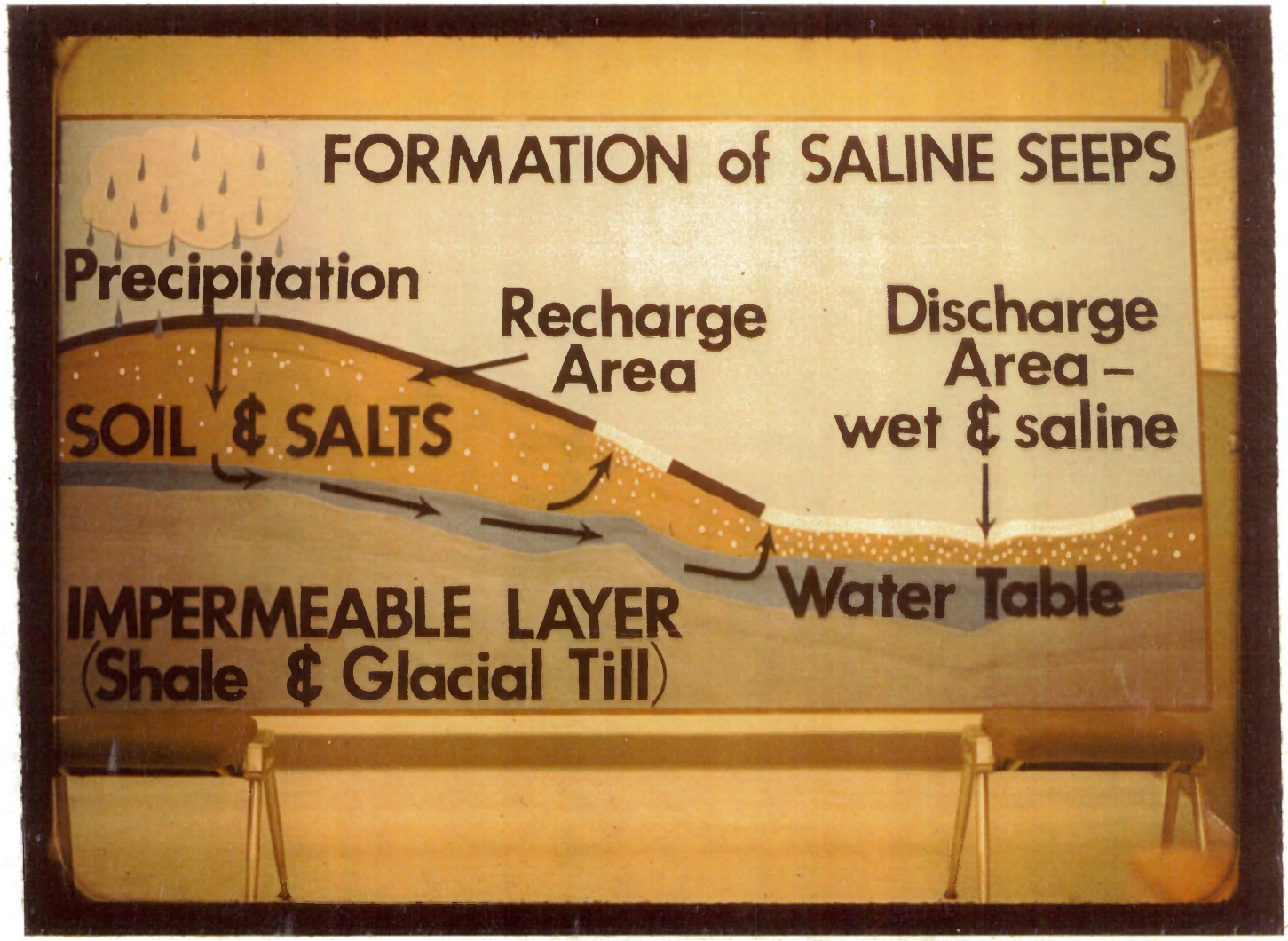

Figure 6 (SCS Photo)
Picture of exhibit prepared by the Highwood Bench Alkali Control Association to illustrate schematically the process of saline seep formation.

CHAPTER IV

HISTORIC CONCERN AND EFFORTS TO TREAT ALKALI PROBLEMS

Pre-1968 Awareness Of Alkali Problem

Why all the concern over alkali now? Is the alkali condition of recent origin? A pamphlet distributed by the Montana Resource Development Committee in 1970 states the problem is not new. It reports that some alkali spots were known to have developed twenty five years ago.[1] An article in the Montana Farmer-Stockman in 1969 states, "The problem isn't new as reported in the Montana Farmer-Stockman, 'North Slope Alkali, September 1954.' Farmers reported that numerous small spots appeared 20 years ago, but the problem appeared minor and few were concerned."[2]

The first known federal or state agency reports on the subject apparently appeared in 1947.[3] These reports were referred to at the meeting in Bozeman in 1969, however, all efforts to locate these reports have failed.

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[1]Wendell Thacker and Heydon Ferguson, "The Story Of Sour Fallow," October, 1970. (Mimeographed)

[2]Leland Cade, "Summer Fallow Has To Go," Montana Farmer-Stockman, July 3, 1969, p. 8.

[3]Minutes of TAP Salinity Meeting, Bozeman, Montana, January 10, 1969.

Several years prior to the formation of the Highwood Bench organization there was concern both in that area and elsewhere within the state. Two examples may be cited: in the late 1950's at a meeting of Soil Conservation District Supervisors in Wolf Point the problem was discussed; in 1968 at a workshop for agricultural money lenders, held on the Fish and Game Department's Augusta winter elk ranch, a discussion of research needs centered around this topic.

Various agency people have been involved and concerned with this problem for many years. Personnel in the SCS office in Ft. Benton were aware of the problem in the 1940's.[4] The technician in charge there talked with many farmers about it. He conducted surveys and field reviews with agronomists and engineers participating. The general diagnosis and recommendations that came out of these studies were very similar to those recently developed.

Extension Service people were discussing the problem with farmers in the early 1960's. Charles M. Smith, Extension Soil Scientist, Cooperative Extension Service, saw the problem in the field during this time.[5] He contacted Cliff Hyde, Professor of Soils, Montana State University, and received the benefit of Hyde's ideas about the cause of the seeps. Here again the diagnosis was very similar to present thinking. As a result of Extension Service inquiry at Montana State University, Heydon Ferguson got involved with the problem at about this same

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[4]Wendell Thacker, personal letter, January 6, 1972.

[5]Charles M. Smith, personal letter, February 16, 1972.

time.[6]

Art Shaw, Extension Agronomist, was also aware of, and concerned about, alkali seeps.[7] It was he who later joined with Wendell Thacker, SCS Agronomist, in urging an organized approach by the Chouteau County people to cooperatively solving the problem.

The accelerated development of the alkali problem in the 1960's can be attributed mainly to three things. First, it has taken many years of cropping under the summerfallow system to raise the watertable to the point where seeps develop on a large scale. Second, as can be seen in table 1, the average precipitation for the period 1961-70 has increased over the previous ten year period. The increase in precipitation coupled with the existance of a water table already under part of the land has accelerated the problem. The third reason has to do with the increased percentage of land in summerfallow each year. Under farm programs of the late sixties it was common to have less than half of the cropland seeded each year. As a result there were areas where (in the name of soil conserving use) a given field would be double or triple fallowed. This practice contributed to the build-up of the ground water supply.

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[6]Heydon Ferguson, personal letter, January 26, 1972

[7]Wendell Thacker, personal letter, January 6, 1972

Drainage Efforts To Control Alkali

There have been attempts to collect the excess water as it comes to the surface and remove it through drains. The practice is limited because of cost, poor soil permeability, and the inconvenience it causes in getting machinery over the land.[8]

SCS technicians have frequently been asked to give drainage assistance. Typical of these requests is one from C. H. Perry, a small grain farmer living 12 miles southwest of Ft. Benton. Frank Ferentchak, SCS Irrigation and Drainage Engineer, inspected at 6,000 foot drain on Perry's land. This drain in places was nine feet deep. It was running about ten gallons per minute. Ferentchak pointed out in his trip report the limitations on drainage and the need to apply benefit-cost analysis to arrive at some analytical decision on the value of drainage. He mentions the need to consider the land taken out of production for the drain and the inconvenience of working around the drains with machinery.[9]

Mention was made earlier of the low permeability of these soils. Drainage becomes very costly as the area effectively served by one drain is quite limited. A report of an investigation of the Highwood area states:

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[8]Letter to Claude Conant from Wendell Thacker, October 11, 1968.

[9]Memo to Leland L. Holstine from Frank Ferentchak, "Drainage--Ch. H. Perry," May 13, 1963.

> The fact that there are no well defined zones of permeability feeding water into the wet areas and since at least some of the areas are under some artesian pressure the possibility of interception drainage seems unlikely. Too, many of the areas are so small that the cost of drainage would be more than the value of the land benefited."[10]

Another problem created by drainage is what to do with the waste water. The pollution aspects of running salty water into a drainageway must be considered. Here legal liabilities may also be involved.

Based on present knowledge of drainage, many researchers feel it has limited use in solving alkali problems. This belief, however, is not shared by all. Most observers feel there should be more study and research on this phase of control activities.

Vegetative Efforts To Control Alkali

Early attempts at using vegetative methods of controlling alkali spots were aimed at treating the symptoms rather than the cause. Much effort was made to find plants that would tolerate the high salt concentration of the seeps. The idea was to establish these plants in the seeped areas to provide cover, other than weeds, and more importantly to use up the excess ground water. This really is no answer to the problem since the water would still move to the seep area carrying more salts. Soon a point would be reached where the salt concentration would be too high for any kind of plant growth.

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[10]"Report on Wet and Saline Areas On Highwood Bench," Chouteau County, Montana. A report prepared in 1955 by Soil Conservation Service Personnel, Soil Conservation Service, Bozeman, Montana.

The role of vegetation as a control is summed up well by Heydon Ferguson: "The most reasonable means of preventing water movement through the soil profile is to use the water for crop growth before it penetrates beyond the root zone."[11] This could be done by planting permanent vegetation of some type in the recharge area (see figure 6 page 22), and use for either hay, pasture or seed production. This would be difficult for area farmers since it would involve different machinery and management skills than are used for small grain production.

Another alternative would be to seed to small grain every year. Here again there are problems. Weed, insect, and disease control techniques would require research and modification. The mechanical problems of seeding into stubble would need to be solved. Federal farm policies would have to be adjusted or farmers would have to abandon acreage control programs.

Many farmers have by one means or another seeded some of their land to annual crops for several years in a row. Glenn Bramlette reported some of the results in a talk in Great Falls at the Saline Seep-Fallow Workshop. He said:

> Burton Long, 'We have had satisfactory results in recropping barley.' Fred Booth, '...after four years of continuous cropping, 67-68-69-70, the areas have dried up to the point where they can be farmed entirely and in some cases growth has returned to the areas.' Tom Wharram, '...after two seasons of continuous cropping on the same fields we can definitely see

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[11]Heydon Ferguson, "Soils, Crops and Fertilizers," in Proceedings--Saline Seep-Fallow Workshop, (1971) p. 1.

> quite a difference in the spread of the problem. ... I really believe with continuous cropping in the future we can actually gain on these bad areas and eventually get control of them ...'. These results plus my own over the past four years convinces me that we will be able to control and reclaim these saline seep areas by continuous cropping.[12]

Another vegetative method discussed but not employed much to date is the use of phreatophytes to extract water from the subsoil. Phreatophytes are plants that extract large quantities of water directly from the saturated zone beneath the water table. Several such plants, namely Tamarix aphylla (athel tree), Tamarix gallica (salt cedar), Halimodendron halodendron (salt bush), and Medicago sativa (alfalfa) have been selected and will be planted on an experimental basis next spring.[13]

Notwithstanding several new problems of a technical, managerial or political nature, the use of continuous growing cover on the recharge area offers real promise in control of alkali seeps.

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[12]Glenn Bramlette, "Control of Saline Seeps By Continuous Cropping," in Proceedings--Saline Seep-Fallow Workshop, (1971) pp. 2-3.

[13]Marvin R. Miller, "Hydrogeology of Saline-Seep Spots In Dryland Farm Areas-A Preliminary Evaluation," in Proceedings--Saline Seep-Fallow Workshop, (1971) p. 3.

CHAPTER V

ACCELERATED LANDOWNER AWARENESS OF PROBLEM AND COROLLARY AGENCY CONCERN

The Evolvement Of The Technical Action Panel (TAP) Commitment

Pressures really started to build in 1968 for something more than piecemeal efforts to solve the alkali problem. A few farmers in the Highwood and Ft. Benton areas were beginning to appreciate that summer-fallow, and especially double and triple fallow, was a first level contributor to the problem. As noted earlier, several agency and state college people not only were aware of the problem but had sound explanations for its cause. Something was needed to tie the pieces into a practical yet effective package.

Much was needed in the way of research and special studies in all aspects of the problem. To be effective, requests for such studies and research need to have organization and broad application potential behind them. They also need funding. Federal farm programs might have to be adjusted. This takes organization and political muscle. All the land in a community or a logical geographic area needs to be treated together. This is especially true since the recharge areas may be on different ownership than the discharge areas. Thus total neighbor

cooperation is essential. This takes organization. No matter what aspect of the problem you look at, it becomes apparent that "organization" is vital to a dynamic, continuing effort.

Farmer interest was at a high pitch in 1968. The principle reason for this appears related to the rainfall pattern. Table 1 shows that in three of the four previous years the precipitation was above the ten year average. This additional moisture increased the size of the alkali spots markedly.

Wendell Thacker, in his staff position as SCS Agronomist, had been asked by several SCS District Conservationists to give assistance with the alkali problem. He had been in the field several times in Fergus and Judith Basin Counties. In 1968 he was asked by Oscar Pederson, District Conservationist in Chouteau County, for help. Many times when Thacker, or for that matter other agency's specialists, met with farmers and looked over their land, they made recommendations for alleviating the problem. A check back later would reveal nothing really significant had been done. With this history of no follow-through on recommendations on the part of the farmer, Thacker was convinced some other means would need to be employed to get action.[1]

During this time the agencies of the United States Department of Agriculture were organized into state and county Technical Action Panels (TAP). Representatives of each agency, plus other knowledgeable people where invited, were on the panel, and the resources of each agency were supposedly at the panel's disposal. The purpose of TAP was to provide

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[1]Wendell Thacker, personal letter, January 6, 1972

a panel of experts to help solve problems relating to land, water, and plant use. In theory the TAP approach was sound, but in practice it never really got rolling in most areas. Its role was viewed with skepticism by not only the rural public but also by many of its members as well.

The principal weakness in TAP seemed to be the fact that no one would take the time needed to really coordinate a program or problem and act as liaison to see it through. The local county TAP would meet and discuss a problem. If it required resources of time and talent from outside the county they would pass the problem on to the state TAP. Here it would be reviewed and given the state's blessing, but if no one would doggedly champion the particular cause it would simply be set aside for someone to work on it if they had time.

Thacker was convinced that TAP had the potential for getting the solution to the alkali problem off the ground. He discussed this with A. F. Shaw who agreed to join in suggesting this approach. On May 29, 1968 these two sent a memorandum to Oscar Pederson and George Erickson (District Conservationist, SCS, and County Agent, Extension Service respectively) suggesting the TAP approach and pledging support and assistance.[2] In this memorandum they also suggested sending a questionnaire to farmers in the Highwood area to gather information on the extent of the problem and farmer awareness of it. They further suggested that an effort be made to get local farmers behind a request to the state TAP for help.

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[2]Memo to George Erickson and Oscar Pederson, from A. F. Shaw and Wendell Thacker, May 29, 1968.

The Chouteau County TAP was willing to give this approach a try. In June they formally advised the state TAP of the problem. During the summer they conducted a survey, using the questionaire Thacker and Shaw had suggested, and tabulated the results. As a result of the survey the Chouteau County TAP was joined by six other county organizations in requesting the state TAP give direct assistance. These six groups were the Chouteau County Soil Conservation District, the Big Sandy Soil Conservation District, the Chouteau County Commissioners, the Chouteau County ASCS, the Chouteau County Farmers Union and the Chouteau County Farm Bureau.[3]

Claude Conant, Farmers Home Administration, was serving as executive secretary for the state TAP. During the fall he kept in touch with Thacker and when the suggestion was made to have a meeting of state level representatives of all USDA agencies to discuss what could be done, he agreed and set up the meeting.

When the meeting was held three Highwood area farmers, Norris Hanford, Glenn Bramlette and Fred Booth, drove to Bozeman to sit in on it.[4] The fact that these three would drive to Bozeman to plead their case impressed the agency people. Their presence was convincing proof that they needed help, wanted it, and were willing to battle to get it. Looking back it seems this was a turning point in the problem-solving.

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[3]Letter from Chouteau County TAP to Montana State TAP, September 10, 1968.

[4]Wendell Thacker, personal letter, January 6, 1972.

The farmers presence convinced the agency people and the fact of the agency people calling the meeting gave confidence to the farmers. The two groups actions proved re-inforcing.

All agencies were not equally committed to the alkali cause at this point. Later as the legal district was formed, and studies and research projects got underway, more enthusiasm developed. In addition, the organized Highwood group was speaking more and more to people in high places and this perhaps had an influence on agency participation at the state and local level.

By September Norman Wheeler, FHA Director and State TAP Chairman was prepared to issue a statement regarding TAP commitment to the alkali project. This statement was in the form of the findings and recommendations of the TAP subcommittee on seeped and saline soils. The subcommittee made several recommendations on proposed programs and projects relating to alkali control. These proposals were accepted by the state TAP executive committee and provided formal commitment of TAP to the alkali control cause.[5]

Formation Of Informal Association

From this nucleus of the three farmers just mentioned, plus two more, Burton Long and Tom Wharram, the informal Highwood Bench Alkali Association was formed.[6] The purpose of this organization was to

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[5]Letter to Oscar Pederson, District Conservationist, SCS, from Norman C. Wheeler, Chairman, State TAP.

[6]Minutes of State TAP Subcommittee on Problems of Wet and Saline Soils, Montana State University, March 21, 1969.

promote research, educate farmers to the problem, and in general, promote a control project. As a group they also could approach and work with agencies more effectively.

By April some 75 farmers had joined this volunteer association. Members were assessed dues in order that the association might have some money to help get the project moving. With the money they raised they published an information newsletter, bought a rain gage, and financed part-time work-study help. They also bought aerial photos to assist in the project.[7]

The original request for formal Montana State University involvement was made by this association.[8] In addition they petitioned ASCS for a reduction in their conserving base.[9] Their request was routed to Washington where it was reviewed and received a favorable report back to the state to allow it.[10]

As the farmers operated within the informal association they had formed they soon saw where there would be advantage to organizing legally under state law. They could then levy taxes against themselves

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[7]Letter to J. A. Asleson, Dean of Agriculture, Montana State University, from Burton Long, Association Secretary. April 30, 1969.

[8]Ibid.

[9]"Conserving base" is a term used by ASCS to identify those acres which must be maintained by a producer (farmer) who is participating in a price support program, in what is designated as soil conserving use. Summerfallow is designated as a conserving use. To get price support for crops grown, the conserving base minimum must be maintained. This precludes planting supported crops on summerfallow land that is part of the base.

[10]Minutes of State TAP Subcommittee on Problems of Wet and Saline Soils, Montana State University, March 21, 1969.

and make commitments not possible with the informal structure. With this in mind the process of legal formation began.

CHAPTER VI

ROLE OF LEGISLATURE AND STATE AGENCIES IN LEGAL DISTRICT FORMATION

Enabling Legislation

One of the disadvantages of approaching problem-solving with legal group action is the lack of available statutory authority to organize. In Montana, prior to 1969, there were no laws under which districts, such as the Highwood Bench Alkali Association, could easily form. The Montana Soil Conservation Committee and the Montana Association of Conservation Districts were aware of this. They went to the 1969 Legislature with a proposal to amend the enabling legislation then on the statutes to provide for special district formation. This attempt at amendment succeeded and was signed into law.

Section 76-224 of the law, as amended, gives Soil Conservation Districts authority to establish special project areas where 50 percent of the free holders so petition. It also provides for making special assessments within these districts. Sections 76-225, -226, -227, -228 and -229 of the act prescribe the method of conducting hearings and elections, filing notice of creation, handling protests to formation, defining area and handling expenses of special districts.[1]

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[1]Montana Soil and Water Conservation Districts Law, As Amended 1969, Cooperative Extension Service, Montana State University, Bozeman, Montana.

Chouteau County Soil and Water Conservation District as Sponsor

Soon after the enabling law was amended the informal Highwood Bench Alkali Association began working to organize as a legal entity. The Chouteau County Soil and Water Conservation District Board was favorably inclined to act as the sponsor under the new law. There was an interlocking directorate here as Tom Wharram served on both the SWCD and Highwood Bench Association boards. Even without this feature the SWCD was anxious to help. Most of the SWCD board (one exception will be mentioned later), and the already active informal group of farmers went to work gathering information, discussing the proposal to legally organize and getting freeholders' signatures on a petition to do so.

Chronology of Alkali District Formation

Petition to organize

On January 6, 1970 a petition signed by 160 freeholders in the Highwood and Ft. Benton areas was filed as required with the Chouteau County Soil and Water Conservation District.[2]

Establishing proposed boundaries

In the initial proposal the district boundaries were related to already existing school districts. All of four school districts and

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[2]Notice of Hearing Upon Special Project Area. Chouteau County Soil and Water Conservation District, Ft. Benton, Montana, January 14, 1970.

two townships in a fifth were included.[3] At the hearing, landowners were advised they could petition out of the district. A few later did where they were in the fringe area and were not affected with the problem.

Hearings

The public hearing was advertized on January 14, 1970[4] and held February 10, 1970. After discussion involving the proposed district boundaries, and the process of petitioning out of the district, the petition was accepted by a unanimous vote of the SWCD board present. A date for the election was set and a polling superintendent was named.[5]

Information activities prior to vote

Mention was made earlier of the information activities of the informal alkali association. When a date was set for the election they set a date for a public information meeting.[6] This meeting along with newsletters and personal contact provided information to the landowners on the proposed legal district formation.

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[3] Ibid.

[4] Ibid.

[5] Minutes of Public Hearing To Establish A Special Project Area On Highwood Bench, Ft. Benton, Montana, February 10, 1971.

[6] Ibid.

Results of special election

Landowners expressed themselves about the proposed district at the polls on April 7, 1970. The vote was 72 for, 27 against and 21 challenge votes. The challenge votes were never opened.[7]

The legal district was formed. It remained then for the landowners under the direction of the Chouteau County SWCD to organize. The officers of the old informal district were installed as the new officers.

Actually little, if any, change in purpose, commitment or goals occurred with the change from an informal to a formal legal organization. In the remainder of this paper the events and circumstances discussed will make no differentiation with regard to these two associations. The principle advantages gained by the legal organization were taxing ability, continuity, and a favorable position of leverage with regard to approaching agencies of government for assistance. As far as the individual efforts of the activists in the association there is nothing to indicate any major change with the change in organizational status.

[7]Minutes of Chouteau County SWCD Meeting, Ft. Benton, Montana, April 7, 1970.

CHAPTER VII

DISTRICT PROGRAM DEVELOPMENT

Approach To Agencies of Federal And State Government

When visiting with the leaders of the Highwood Bench Alkali Control Association (HBACA) one is impressed with their grasp of the alkali problem. They are extremely knowledgeable regarding what is known about saline seeps as well as the research that is currently going on. They make a real effort to study all phases of the problem and are well read on the subject. This self assurance and confidence puts these people in a very favorable position when they talk with researchers and agency administrators. You get the feeling right away that these are people who know what they are talking about.

They recognize where help is needed and have developed a knowledge of public agency operations so they know where to go with a particular problem. They are quick to admit that this whole experience has been a real education for them.

Because they have made themselves knowledgeable, they are able to take a very direct approach to agencies for help. For example, at the January 10, 1969 meeting referred to earlier, of the 21 people present 18 of them were researchers, specialists or agency administrators. Glenn Bramlette, Norris Hanford and Fred Booth were the three farmers.

Later Thacker, who was at the meeting, remarked on the able way these people expressed themselves. Thacker feels the fact that these three farmers made this direct appeal to the agency group in such an able fashion, was responsible in large measure for the subsequent interest by the agencies.[1]

Whenever the Association has felt a particular agency could help them, they went directly to the agency with a request. It was as a result of such a request in May 1969, that the Montana Bureau of Mines and Geology got involved.[2] In April 1969, the Association wrote J. A. Asleson, Dean of the School of Agriculture, Montana State University, and asked what the University would do for them.[3] They made similar requests to the Montana Experiment Station and Agricultural Research Service. These same agencies were members of TAP and were getting the pressure from there as well as from the Association. As a result of one or both, they all went to work on the project.

Level Of Commitment By Local People And Its Effect On Agency Inputs

We have already seen where one of the primary purposes of legal organization was to provide for assessing a levy against property in the district. Earlier, members of the informal association were making

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[1]Wendell Thacker, personal letter, January 6, 1972.

[2]Marvin R. Miller, personal letter, January 14, 1972.

[3]Letter to J. A. Asleson, from Burton Long, Association Secretary, April 30, 1969.

donations to help solve the problem. This alone is a pretty convincing argument that you are really behind the effort. Such voluntary financial commitment alone sells the program to others who can help.

Paul L. Brown says it very well.

> The fact that the Highwood Alkali Control Association is taxing themselves is very significant. It gives the members a sense of participation. It demonstrates to all that the Association is vitally interested in solving the problem.[4]

Another measure of commitment is the amount of time individual members of the Association are willing to put into the project. Several members, mostly the officers of the Association, have spent many days of their time, working on the alkali problem not only in their own area, but all around the state.

In one instance, (the Saline Seep-Fallow Workshop), Glenn Bramlette, Norris Hanford, Burton Long, Fred Booth and Tom Wharram, spent days planning, preparing for, and helping put on a special workshop. While this was aimed at Highwood Bench farmers, it was also advertized over the state. The farmers mentioned were largely responsible for selling the research people on the need for such a meeting. Their enthusiasm was contagious and the meeting, held in Great Falls, turned out to be a real success with about 300 people attending.[5]

After this meeting several other locations in the state became interested in holding a similar session. Several more meetings were scheduled and this same group of farmers went "stumping" the state on

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[4]Paul L. Brown, personal letter, December 23, 1971.

[5]Wendell Thacker, personal letter, January 6, 1972.

their own time in the interest of saving the land resource.[6] At the time this paper is being prepared Norris Hanford is in Washington D. C. testifying before congressional committees in the interest of getting research money for the project.

(Mr. Hanford's assistance to the Master of Resource Administration Program is typical of his efforts. An invitation to meet with this group for an evening in Great Falls in November of 1971 to discuss the alkali problem, brought an immediate affirmative response.)

The point is that high level commitment on the part of local people really makes the project go. This interest was in part spontaneous with them and in part generated by a few key agency people, a facet which will be discussed in the next chapter.

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[6] Ibid.

CHAPTER VIII

STATE AND FEDERAL AGENCY CONTRIBUTIONS

Chouteau County Soil and Water Conservation District

The Chouteau County SWCD through the revised district enabling law served as the vehicle for legal organization of the special alkali district. They assisted in preparing the petition and in getting signatures to it. They conducted the hearings on the proposal to form the new district.[1] They hired the polling officers for the special election.[2]

As sponsor, they have a continual obligation to review and approve the annual budget and request for mill levy of the special district, and request the county officials to levy the tax.

Even before the legal formation of the alkali control district, the SWCD was active in seeking solutions to the problem. They met with interested farmers and discussed programs with them. They gave priority to controlling saline seeps in their annual work plans and, where appropriate, acted as agents in getting support from other agencies.

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[1]Notice of Hearing Upon Special Project Area, Chouteau County Soil and Water Conservation District, Ft. Benton, Montana, January 14, 1970.

[2]Personal conversation with Tom Wharram, April 1970.

Montana State Soil Conservation Committee

This state body was particularly helpful in getting the legislature to amend the district law to provide for formation of special districts. Since this was the first application of the new law the Executive Secretary of the State Committee worked closely with the Chouteau County people in an advisory capacity. He also obtained for them opinions from the State Attorney General's office regarding application of the new law.[3]

Montana State University and Montana Agricultural Experiment Station

These two institutions are so closely associated they are considered one here. Together they have supported the project both in interest (attending meetings, field trips, and planning sessions) and in research. They received a $30,000 grant from the Agricultural Research Service (ARS). They prepared the research plan upon which the grant was based and have administered the funds. They have provided a full time technician to work in residence on the project and assist all other researchers.[4] Ferguson is also acting as research coordinator on the project.[5]

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[3]Personal conversation with O. M. Ueland, Executive Secretary to the State Soil Conservation Committee, March 9, 1972.

[4]Heydon Ferguson, personal letter, January 26, 1972.

[5]Charles Smith, personal letter, February 16, 1972.

Through the Moccasin Branch Station the Agricultural Experiment Station established research plots to study cropping intensity treatments to determine the degree of soil moisture use. This work was started under the direction of Ray Choriki. Tom Hanson, Agricultural Engineer with the Experiment Station, is researching the feasibility of drainage.[6] E. R. Hehn, Head, Plant and Soil Science Department, Montana State University, has actively supported the project. He has attended planning sessions, information meetings, and field trips.

Montana Bureau of Mines and Geology

The Bureau got involved in the hydrogeological aspects of the alkali problem as a result of an invitation to attend a meeting of the original Highwood Bench Alkali Association. Marvin Miller, Hydrogeologist with the Bureau, has spent a considerable amount of time on the project. He installed a large number of test wells and is doing research on the water table in relation to the surface and subsurface land features. He is also doing chemical analysis of the ground water.[7]

The Montana Joint Water Research Center is cooperating with the Bureau of Mines and Geology in this phase of the work. Their joint effort in dollars over the period 1969-72 will total $31,660.[8]

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[6]Letter to Glenn Bramlette from C. R. Hehn, May 10, 1969.

[7]Heydon Ferguson, personal letter, January 26, 1972.

[8]Marvin Miller, personal letter, January 14, 1972.

Cooperative Extension Service

The county agent for Chouteau County and Charles Smith have been the most active members of the Extension Service to be associated with the research and district activities. The county agent, George Erickson, has assisted both the Chouteau County SWCD and the Highwood Bench Alkali Association with their programs.

Smith worked with Experiment Station personnel in setting up the experiment seeking to determine if crop management and fertilizers would affect water use.[9] He was also very active, especially in the early stages, in encouraging and assisting local people to get their district organized and research going.[10]

The Cooperative Extension Service contributed the duplication of materials used at the various meetings around the state on this subject over the past few years.

Agricultural Research Service

Paul Brown, ARS, has been very active for the past three years in the research phase of the alkali problem. He is working in the area of water use by various crops. As of October, 1970 he was committed to spend 20 percent of his time to the project. By July 1971 this had increased to 40 percent.[11] In addition the $30,000 grant to the

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[9]Charles Smith, personal letter, February 16, 1972.

[10]Wendell Thacker, personal letter, January 6, 1972.

[11]Paul L. Brown, personal letter, December 23, 1971.

Experiment Station mentioned earlier, came from ARS.

Agricultural Stabilization And Conservation Service

The agency is responsible for administering the acreage control and allotment programs of the Department of Agriculture. When petitioned by the Highwood Bench farmers for a reduction in conserving base acres, they responded by lowering bases on several farms.[12] This allowed for easier continuous cropping of fields considered as critical recharge areas.

Farmers Home Administration

The principle contribution of this agency was the part Claude Conant played as executive secretary to the state TAP. Also, the state FHA director was chairman of this group. Their support in the approach described in Chapter V of this paper helped get the program going.

Soil Conservation Service

Soil Conservation Service involvement perhaps dates back further than that of any other agency. Reference was made earlier to the requests for their assistance in the 1940's and 1950's. SCS personnel had been giving assistance with drainage and making recommendations for using

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[12]Leo Kolstad, ASCS State Executive Director, personal letter, December 30, 1971.

plant cover as a control of the seep problem for years.[13] [14] A review of correspondence, reports and minutes of various meetings, held during the time momentum was building for an organization, shows that at the local level Oscar Pederson, SCS District Conservationist, was putting a great amount of time and effort toward the program. At the same time Wendell Thacker, SCS State Agronomist, was working continually at the state level in support of it. The Area Conservationist at Great Falls likewise put high priority on helping with the special district formation.

As accelerated field work got underway the SCS State Office made their drill rig available for drilling the test wells. The SCS geologist and area staff soil scientist spent much time logging the test holes. In addition the soil scientist, Clair Clark, made special soil surveys of the experimental plot areas and classified the test hole areas.[15]

In 1970 the Highwood Bench Alkali Association felt the control program would benefit if a topographic map of the entire area was available. The SCS agreed to prepare a Kelch topographic map. The control survey for this took many weeks of technician and engineer time.[16]

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[13]Memo to Leland L. Holstine from Frank Ferentchak, "Drainage-C. H. Perry," May 13, 1963.

[14]"Report on Wet and Saline Areas On Highwood Bench," Chouteau County, Montana. A report prepared in 1955 by Soil Conservation Service personnel, Soil Conservation Service, Bozeman, Montana.

[15]Heydon Ferguson, personal letter, January 26, 1972.

[16]Personal conversation with Wayne Otto, SCS Area engineer April 1972.

A. B. Lindord, State Conservationist, has continually supported the work by both personal involvement and by making techical time and equipment available.

Other

There are other groups who have had important if minor roles in helping on the alkali problem. The Board of County Commissioners have cooperated in the establishment of the special project area. The Economic Research Service helped with the workshop in Great Falls.[17] Neighboring Soil Conservation Districts cooperated in giving up SCS technical time to the project.

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[17]Wendell Thacker, The Control and Prevention of Saline Seeps on Fallow Land, a progress report, Bozeman, Montana, March 1971, flyleaf.

CHAPTER IX

EVALUATION OF FORMAL DISTRICT--MULTI-AGENCY APPROACH TO PROBLEM SOLVING

Advantage Of District Versus Individual Effort In Solving The Alkali Problem

Many reasons supporting an organized district approach over individual effort have been advanced. An attempt will be made here to summarize the most important of these. Paul L. Brown wrote:

> As of 1971, the grass roots request is about the only approach that will produce federal funds to attack agricultural problems. The fact that the Highwood Alkali Control Association is taxing themselves to provide some funds to solve the problem is very significant. It gives the members a sense of participation. It demonstrates to all that the Association is vitally interested in solving the problem.[1]

Miller says the fact of the farmers organizing themselves, "...unified their efforts, and amplified the urgency of the problem."[2]

Thacker has made the point that agencies are reluctant to tackle large problems requiring much time and money unless they are pretty sure some real action will develop when answers are found. The shear weight of numbers is important if you speak as a large body rather than

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[1]Paul L. Brown, personal letter, December 23, 1971.

[2]Marvin Miller, personal letter, January 14, 1972.

an individual, or for that matter several individuals.[3]

All of these are valid points. Given the variety and large number of demands on public funds, the inclination of public servants entrusted with their disbursement is to assure the best possible use of such funds. In the case of agricultural research, one measure of predictable use of new findings is the interest displayed by fund seekers in the discovery process. What Brown is saying is that those in charge of research funds look to the type and level of organization of a group, as well as the group willingness to dig into their own pockets, as a measure of predicting to what extent the fruits of the research will be used. The cases with the highest predictable use will be in a favorable position relative to those with lower estimated potential use.

The unifying and amplifying effect, mentioned by Miller, is of great importance. This is especially true in a case like the Highwood Bench project. The problem covers a wide area. The recharge area and the discharge areas will often be on different ownerships. Unless some vehicle is found to promote "commonality," the chances of success in solving the problem are reduced. Good neighborliness seems to be reinforced through an organization.

A viable organization has the ability to pull people together in educational and informational type meetings. In the case under consideration, the fact of people knowing they were going to go to a certain meeting seems to have encouraged some prepartation for it on their part. Conversations with several agency people most involved, indicates they

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[3]Wendell Thacker, personal letter, January 6, 1972.

feel the level of knowledge of the farmers seems greatly increased where they are involved in meetings. They feel this is not due alone to what the people hear at the meeting, but in large measure because they want to use their time to best advantage, so study and talk among themselves ahead of time in order to ask the best kinds of questions.

The amplification came in this case because many people had the problem and did not realize it or did not realize something could be done about it. Also those people in the recharge areas, who had few or no alkali spots on them, were not always aware of their own involvement. The move to create the special district caused many to ask: "Why"? When they found out why, they added their voices and influence to the cause. The organization provides a vehicle for getting efficiency from individual participation. Rather than several people making identical inquiries or contacts, one person in the name of the organization can make them. Busy administrators and research people really appreciate an organization taking on the burden of diseminating information. Understandably, they would prefer to spend their time in discussion with a few well informed people rather than with each person with the problem. A formal organization can find, from among its members, the best informed and most interested and arrange for them to be the agency contact.

A final point in favor of a formal organization is the feeling the local farmers have about this approach. In conversation, many of them have expressed the feeling the Association is doing for them what they could not do without it. That the district inspires this confidence and optimism is a convincing argument in its favor.

Effectiveness of Interagency Effort

Problems due to policy, organizational or personnel conflicts

By request, seven people most actively involved in research or other assistance to the Highwood Bench Alkali Control District, responded to questions related to their agency's involvement and the interaction between agencies and personnel. The general response was highly complimentary of the cooperation between agencies. In fact all respondents felt positively about the interagency relations. Ferguson stated, "I can only be amazed at the cooperation between the agencies."[4] Brown said, "Maybe part of the spirit of cooperation is due to the lack of adequate funding. We've all had to scrounge and help each other in order to accomplish what we have done to date."[5]

Only two problems of significance (and this only minor in retrospect) seem to have occured. One of these relates to agency policy or objective and the other to individual personalities.

The first of these conflicts, regarding agency objectives, involves the Agricultural Stabilization and Conservation Service (ASCS) and the request for a reduction in the conserving base for certain farms.[6] Of those agencies involved in this project, ASCS is unique in that its role is regulatory and has a "permissive" relationship to

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[4]Heydon Feguson, personal letter, January 26, 1972.

[5]Paul L. Brown, personal letter, December 23, 1971.

[6]See footnote No. 9 on page 35 Chapter 5.

Farmers regarding the farm programs they administer. All the other agencies concerned are service oriented, either in research education or technical assistance. This difference in itself creates the possibility for conflict.

The County ASCS Committee has the sometimes unpleasant task of cutting back acreages or adjusting average yields. The probability that farmers in other parts of the county would complain about what appeared to be an advantage to the Highwood Bench farmers must have been cause for concern to the committee. The way they handled the request for a conserving base reduction gives the impression they wanted someone else to make the hard decision, or else they were wary because of the precedent this adjustment would create.[7]

Later on, and after a downward adjustment in conserving base was made, another conflict arose. This involved the paradox that in order to continuously use annual crops as a means of depleting deep soil moisture, some means of increasing surface moisture would be necessary. This would assure enough surface moisture to get a crop started every year. In order to do this some farmers are using grass wind barriers spaced at 30 to 50 foot intervals across the field (see figure 2, page 7). These barriers trap snow during the winter which then provides

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[7]The request for adjustment in conserving base went to the Chouteau County ASCS Committee. (A committee of three Chouteau County Farmers) They could have acted to approve the request but chose rather to pass it on to the state committee. The state committee, rather than advise, passed the request on to their Washington D. C. office. The Washington office then informed the county office, through the state office, that written policy already in their hands gave them authority to make adjustments.

the extra moisture needed.

The ASCS objected to the fact that they had granted conserving base adjustments to allow for continuous cropping only to have the grass barriers employed to catch more moisture. They failed to see that in order to use water you had to save more at certain times. This conflict was resolved, but only after some considerable exchange between ASCS and an alkali Association official.

One other event may have had significance. There was an interlocking directorate relationship until mid 1970 between the ASCS and the Chouteau County SWCD. The County ASCS Committee Chairman was also a member of the SWCD board. He was not present at the SWCD meeting when the petition for forming the Highwood Bench alkali Control Association was accepted. Shortly after the favorable vote on forming the special district he resigned his position on the SWCD board.

The second difficulty stemmed from the reluctance of some Extension Service personnel to be aggressive in the education aspects of the program. At least one County Agent expressed the feeling: "This is entirely a research problem and should only involve research agencies." An attempt to get county agents involved in the February 1971 workshop in Great Falls, by those planning the meeting, was relatively ineffective.

There were and are other minor jealousies and conflicts apparent. Perhaps these are actually assets rather than liabilities. As one of the principals expressed it: "The differences between agencies are healthy and sharpen the focus on the problem. Solving them is beneficial to a perspective of the problem and increases appreciation of each

agency's dependence on the others."[8]

Strength of multi-agency approach

With a problem as complex as this one, no one agency has all the answers. Some of the agencies, namely SCS, Montana State University, ARS and the Agricultural Experiment Station, have developed expertise over a wide field of disciplines. With the SCS this is more of a practical, "on the ground," kind of experience. With the other three it is more of a matter of research experience.

With ASCS, FHA, Cooperative Extension Service (CES), and the Bureau of Mines and Geology the expertise is narrower. With ASCS it relates to regulation of acreage allotments and average yields as well as dispersing cost sharing and subsidy payments, FHA specializes in farm finance, CES in education and information and Bureau of Mines and Geology in Geologic, Hydrogeologic, and mineralogical areas.

Any one agency, and in this case several, might have a casual knowledge of the total problem. However in this type of problem-solving, intimate, accurate knowledge as well as experience in general application is necessary. For this reason there is real strength in a multi-agency relationship with all sharing in the responsibility of finding a solution to the problem.

One agency could have acted as the sole partner with the Association and have continually gone to the other agencies for help. This

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[8]Wendell Thacker, personal letter, January 6, 1972

would not bring the joint concern and feeling of responsibility that is had by all sharing together the role of assisting the local organization. In other words, in the multi-agency approach each is helping the Highwood Bench Alkali Control Association. If any one were to take sole responsibility the others would be placed in the role of helping another public agency rather than helping a grass roots organization. The real strength in the TAP concept is this joint partnership approach to problem-solving.

CHAPTER X

SUMMARY

No one associated with the Highwood Bench Alkali Control Association seems ready to say the saline seep problem is solved. They do feel optimistic about solving the problem.

Research is currently underway in several areas. These include the nature and extent of the water table, the effect of water extraction by different cropping systems, the effect of fertilization on water extraction by plants, and new kinds of plants which would be useful to help lower the water table. Farmers are looking for answers to new problems they must face with changes in their operations required to solve the seep problem. They are concerned about weeds, insects, plant diseases, management of crop residue from annual cropping and other related matters.

They are concerned about polluting surface water with salts. In this day of ecological awareness it is interesting to consider the ecological damage as a result of overstocking the groundwater table. (Ironically we are usually talking about the adverse effect of lowering the water table.) We have pointed out in this paper that as the stock of groundwater is increased the potential for additional saline seeps increases. This in turn increases the pollution potential for the entire watershed.

In solving resource problems a vehicle is needed to unite,

encourage, solidify and facilitate farmers' efforts. In the case under consideration, reports going back several years evidence the existance of the problem, something of its cause, and even offered possible solutions; however for years little was done. This was partly because the problem was viewed as not really acute and partly because a viable vehicle for transforming concern to action was not yet developed. This vehicle seems to exist now for the Highwood area people in the form of TAP and the Highwood Bench Alkali Control Association.[1] Most of the progress in problem-solving to date has come about through these two entities.

Certain features seem to be critical in the success of the multi-agency and special district approach used. First, there must be a problem: real, easy to see, and of fairly wide concern. Second, the organization must concentrate where the problem is of priority concern to the landowners. (This may mean leaving a few people outside the district boundaries and anxious to get in.) Third, there is a need for a person, or persons, willing to make the sacrifice of devoting unselfishly of their time and energy to act as a coordinator or thread of continuity and stability, at least in the early stages.

The Highwood Bench Alkali Control Association had all three. They had the problem, which was economically critical and of concern over an area international in size. They confined their district to an area where the problem was most acute and where the average farmer was quite

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[1]TAP no longer exists. The role of the agencies that were involved remains much the same but the name of the "federation" of agencies is now "Committee for Rural Development" (CRD).

concerned.

On the third item, and looking back on the history of the case, it seems like the right people were in key positions. Five farmers, (Norris Hanford, Glenn Bramlette, Fred Booth, Tom Wharram and Burton Long), have devoted themselves to the special district. In correspondence with agency people and by direct inquiry of some of the farmer leaders, two individuals stand out as providing similar service through TAP. They are Oscar Pederson, District Conservationist, SCS, and Wendell Thacker, Conservation Agronomist, SCS.

Pederson spent a tremendous amount of time at the local level working with agencies and farmers to get the project going. His talent for always keeping the action moving without himself being in the limelight seemed to be just the right method for getting the job done. At the state level Thacker's grasp of the problem, his acquaintence with other key agency people, and his personal conviction of the value of the TAP approach seems to have made his role most critical.

These key people were not moved into their respective positions and relationships just because of the alkali problem. Rather, their involvement developed as a result of them seeing this as one of many problems they could and should deal with in the total responsibility of their jobs. As they developed a personal interest in the problem they reinforced each other in a way that would not have been possible had they not each possessed the interest, philosophy, and ability they did.

In addition to these individuals there was a high level of cooperation from most of the others concerned. Several agency people

commented on the fact that this project has had less personal empire-building and bureaucratic tendencies than any multi-agency project they have worked on.

There is reason for optimism. Already some answers seem to be coming but more importantly the human machinery seems to have been "tuned" and adjusted to the point where it can handle the yet unanswered problems.

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APPENDIX

Fort Benton, Montana
September 10, 1968

State Technical Action Panel
Box 350
Bozeman, Montana

Gentlemen:

Chouteau County has an alkali problem that is very severe in the Highwood Benchland, Geraldine, and Big Sandy areas.

We, the undersigned, request your guidance in securing the assistance of the appropriate agencies for help.

The Chouteau County Technical Action Panel has just recently completed an inventory, by mail, to individual farmers. The returns show great concern. The acreage of valuable cropland turning to alkali is growing year by year and, of course, is a great economic loss to the economy of our county as well as the individuals directly affected.

We will appreciate a reply from you for recommended action. We realize there is no easy cure-all for it but perhaps there is more that can be done than we are aware of at the present by a concerted effort.

Signed:

Chouteau County SWC District

Elmer B. Lund
Big Sandy SWC District

Chouteau County Commissioners

Chouteau County Farm Bureau

Chouteau County Farmers Union

Fred Fridbaugh
Chouteau County ASCS

Chouteau County Technical Action Panel

Fred Fridbaugh

CHOUTEAU COUNTY SOIL AND WATER CONSERVATION DISTRICT

AMENDED

NOTICE OF HEARING UPON CREATION OF A PROJECT AREA EMBRACING LAND LYING IN CHOUTEAU COUNTY(S), WITHIN THE CHOUTEAU COUNTY SOIL AND WATER CONSERVATION DISTRICT(S).

WHEREAS, on the 6th day of January, 1970, there was duly filed in the office of the Chouteau County Soil and Water Conservation District at Fort Benton, Montana, a petition signed by 160 freeholders pursuant to the provisions of the soil and water conservation districts law, (Sections 76-101 to 76-117, 76-201 to 76-219, Revised Codes of Montana 1947, as amended, and House Bill 179, Sections 1 through 25, Chapter 291, Montana Session Laws 1969) requesting the creation of a Highwood Alkali Control District project area within the Chouteau County Soil and Water Conservation District(s); and

WHEREAS, the lands sought to be included in the said Highwood Alkali Control District project area by said petition comprise lands in Chouteau County County(s), described substantially as follows:

School Districts 1B, 28, 28B, 28C, and that part of 28A in Townships 21 & 22, Range 6.

NOW, THEREFORE, notice is hereby given that a public hearing will be held pursuant to the said petition, on the question of the desirability and necessity as the public interest or convenience may require for the creation of such Alkali Control District project area within the CHOUTEAU COUNTY Soil and Water Conservation District(s); on the question of the appropriate boundaries to be assigned to such project area; upon the propriety of the petition, and all other proceedings taken under the said act; and upon all questions relevant to such inquiries. The said public hearing will be held by the CHOUTEAU COUNTY Soil and Water Conservation District on February 10, 1970 at SWC Office, USDA Building, Fort Benton, Montana.

All persons, firms and corporations who shall hold title to, or shall be in possession of, any lands lying within the limits of the above described territory, and all other interested parties are invited to attend and will be given opportunity to be heard at the time and place hereinbefore specified.

CHOUTEAU COUNTY SOIL AND WATER CONSERVATION DISTRICT

(Chairman)

Dated this 14th day of January, 1970.

Montana State University
College of Agriculture

Agricultural Experiment Station
Bozeman, Montana 59715 Tel. 406-587-3121

Plant and Soil Science Department

January 26, 1972

Van K. Haderlie
1845 36th Street
Missoula, MT 59801

Dear Van:

Sorry I'm so late.

In a way, I got involved in this project a long time, 6-8 years, ago. This involvement came through questions from farmers to Extension personnel, both State and County. Since this was obviously a water problem, these people came to me for advice. Even a cursory look indicated that the problem was far greater than my research budget could stand, so I gave them only advice. Finally, in desperation, the farmers organized and began contacting various agencies and bringing in administrators of these agencies to look at the problem first hand. The Experiment Station was one of these agencies. Moreover, the farmers raised some money for research. This money, as well as some additional funds from the Experiment Station that were made availabe due to this farmer pressure, made it possible for me to begin a small project on the Highwood Bench. (The will and desire had been there before but you can't do much with no money.) At about this same time, a couple of other things heppened. Research and technical people from the agencies were brought together to discuss the problem and look it over with the farmers. As a result, sort of an unofficial division of interests and responsibilities was worked out by the technical people. Also, as a result to farmer pressure, the Agricultural Research Service made $30,000 available to our Agricultural Experiment Station to be used over a 3-year period for research. This money provided something to work with and resulted in a marked increase in activities. This used to support activities of all of the groups involved except, I think, the SCS. Their work has been gratis.

I do not think that any program at all would have developed without a grass root organization similar to that formed by the farmers. This of course demands leadership, they have it, and a problem that has a high probability of having a solution. The actual type of organization matters little. The Districts law did give this group authority to tax itself, which is a benefit. However, before this was in effect, these farmers made direct contributions.

I can only be amazed at the cooperation between the agencies. I would point out, however, that, at least at this level, the agencies are largely nonbureaucratic and are, to a very large degree, oriented toward problem

solution. I can think of more than one agency that would not fit this description. There have, of course, been some problems. For instance, out of the grant, I have hired one full time technician. Three different people (technically 4) are conducting research on the Bench. Each of these people is inclined to come up with almost a full time work load for this one person. This has put the technician in an uncomfortable position at times.

The main factors in agency inputs are a general desire to do the job, competent people to do the job, freedom for the individual to work as he best can, and financial support. We are in good shape on the first three, but are under supported to do the job. (One of the interesting features of this is that the farm organization had the idea that $30,000 was plenty of money. It isn't for this big a job.) There have been disagreements between the research people but these have not prevented active cooperation. Reasonable people work things out, especially if they are unhindered by bureaucracy.

I hope this is what you wanted.

Sincerely,

Hayden

Hayden Ferguson
Professor of Soils

HF:jd

If you have specific questions I haven't answered call me.

(Hayden Feguson)

A few additional comments:

1) Work began on this project almost immediately after Joe Asleson "said you have a little money to work with". The Experiment Station is realtively non bureaucratic thus it took no paper work to change direction.
2) An important factor in the farmer organization was two interested Agency people--the extension agent and the SCS--area conservationist (O. Pederson). Without this type of person available to do many things these kinds of organizations often fail. But, the driving force was from the farmers.
3) We wrote a basic project here to get the $30,000 grant. So most of the money is spent on things specified in that Project. However, we have appreciable leeway.
4) We make a real effort to keep the farm group apprised of our efforts and our results.
5) Groups actively involved are:
   a) Bureau of Mines and Geology, Marvin Miller, geology and ground water work including chemical analysis.
   b) SCS--Local man is secretary of farmer group and handles many details, Area Soils man did soils classification work, State office furnished men and equipment on several occasions.
   c) ARS--furnished grant monies and released an area research man to work on crop-water use.
   d) Exporiment Station
      1) Moccasin Station set up plots and worked on crop-water use.
      2) Main Station--controlled grant funds--and actively conducted work in all segments of the project.
   e) Farmers--furnished some money, their organization got things going and they have remained very actively involved.
6) The $30,000 comes a far cry from supporting the activities of the 4 research groups. For instance, I would guess that the B of M & G has spent at least $50,000 on the project of which much less than $5,000 came from the grant. The grant has purchased some equipment and supplied one technician who helps everybody.
7) The research is coordinated on a "good fellow basis" and not by chain of command.

(Copy)

Bozeman, Montana
Dec. 23, 1971

Mr. Van Haderlie
1845 36th St
Missoula, Montana 59801

Dear Van,

In reply to your telephone call this a.m., I have written my answers to your inquiries in long hand and am sending them to you this way. Our secretary is off for the p.m. so I thought that you might like to have my reply as soon as possible. I only hope that you can read my writing. I hope, too, that I have answered your questions satisfactorily. If not, I'll try again.

1. How did my agency (USDA-ARS-SWC) and I become involved in problem?

SWC became involved because of the formation of the Highwood Alkali Control Association by the farmers on the Highwood Bench. The Association asked both the Montana Agricultural Experiment Station and ARS-SWC to help with the problem.

I became involved in the problem because it is located within my area of responsibility. From the beginning, I found the problem to be very challenging. I believe that the problem can be solved in 10 years or less. It is a challenge to all of my professional training, experience and imagination.

As of Oct. 13, 1970, I was committed to 20% of time and the projects finances to work on the problem. As of July 1, 1971, my committment increased to 40% of time and finances.

2. What do you see as to the Advantages (Successes) and Disadvantages of the Alkali Control District approach?

As of 1971, the grass roots request is about the only approach that will produce Federal funds to attack agricultural problems. The fact that the Highwood Alkali Control Assn. is taxing themselves to provide some funds to solve the problem is very significant. It gives the members a sense of participation. It demonstrates to all that the Association is vitally interested in solving the problem.

I don't see any real disadvantages to the district approach. It is difficult to get farmers to form another organization. I believe that Oscar Pederson can take a lot

of credit for encouraging the organization of the Association.

It is conceivable that this approach might lead to numerous organized associations to work on the many problems facing agriculture. Perhaps the Chouteau Co. Soil & Water Conservation District could have accomplished the same thing. I don't believe this is true in this case, however, because the problem was recognized to be most acute on the Highwood Bench. The farmers and land owners on the Bench were able to clearly see the problem and organize to do something about it. The organization probably would not have come into being if it had included all of Chouteau County.

3. What are the current problems facing the District and the solution to the problem?

The biggest problem is finances. The following sources and amounts of money are approximately available:

- USDA Grant for 3 yr. period July 1, 1970 to June 30, 1973 - $30,000
- Montana Agricultural Experiment Station $6,000/yr.
- Montana Bureau of Mines & Geology- $8,000/yr.
- USDA-ARS-SWC (including salaries) - $15,000/yr.

This may seem like a lot of money, but the money available simply doesn't even come close to matching the magnitude of the problem on a statewide basis. The problem exists in at least 25 counties east of the Continental Divide. This means that research must be done at a minimum of four locations.

As of this date, there has been no friction or bickering among the agencies involved. There has been wholehearted cooperation between all agencies involved. The good cooperation seems to be due to:

- Fine cooperation and interest by the Highwood Alkali Assn.
- Personal interest and dedication of the personnel working in the field:
  - Clair Clark - SCS
  - Marvin Miller - Mont. Mines & Geology
  - Ray Choriki - Central Mont. Branch Station (now resigned)
  - Paul L. Brown - ARS - SWC
  - James Sisson - Graduate student
  - Oscar Pederson - SCS District Conservationist
  - George Erickson - County Agent
  - Hayden Ferguson - MDU
  - Tom Hanson - MDU
  - SCS area office at Great Falls

Maybe part of the spirit of cooperation is due to the lack of adequate funding. We've all had to scrounge and help each other in order to accomplish what we have done to date.

The MACD passed a resolution calling for a substantial increase in Research Funds. The U.S. Congress will be asked to appropriate the money. The effort will be made through the Montana Congressional delegation.

Some people just can't understand how these agencies can work together so closely without friction. I can only say that it must be due to the interest and dedication of all the people involved. None of the personnel involved are building any empires.

Sincerely,

(signed) Paul L. Brown

USDA-ARS-S.C
Bozeman, Montana

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
P. O. Box 670, Montana State Office, Bozemnn, Mt.

December 30, 1971

Mr. Van K. Haderlie
1845 36th St.
Missoula, Mt.

Dear Mr. Haderlie:

In answer to your telephone request of Jim Ross we offer the attached paper. If we can be of further assistance, please let us know.

Sincerely yours,

Leo S. Kolstad
Executive Director

Attachment

The Agricultural Stabilization and Conservation Service is responsible for administering certain farm programs enacted by Congress, among them being the wheat and feed grain diversion and set-aside programs. The objectives of these programs through the years has been to: 1- Stabilize production at levels that will satisfy our National needs and provide adequate reserves but not excessive surpluses. 2 - Maintain or increase farm income by stabilizing the price structure of farm commodities.

Prior to 1961 wheat production was the only small grain that Congress attempted to control. However, with the continual build-up of carry-over stocks of feed grain commodities Congress felt the need to also control the production of corn, grain sorghums, and barley, thus enacting the feed grain diversion program. The conserving base concept was designed and instituted at the same time to limit overall farm production. Conserving bases were established for all farms with either an established wheat allotment or feed grain base. In general, the farm's established conserving base reflected the historical farming pattern for that farm for the years 1959 and 1960.

Since the establishment of farm conserving bases county committees have had authority to adjust them. County committees have also had the responsibility to treat all farmers fairly and equitably and to administer the farm programs within the intent of the law.

For program participation a farm is required to put to conserving uses an acreage equal to the farm's conserving base plus the agreed upon diversion or set-aside acreage.

When the Highwood Bench Alkali Control Association was formed one of their early actions was to ask the Chouteau County ASC Committee to reduce the conserving bases on the farms in the Highwood Bench area so that the producers could plant for harvest all of their cropland each year. It was the association members feeling that summer fallow operations in recent years

had caused an increased build-up of alkali in the area. Inasmuch as the maintenance of a farm's conserving base was the primary control ASCS had on production output the county committee was reluctant to make the requested adjustments. However, upon further study the county committee agreed to ask permission to make the requested adjustments. Program regulations gave the committee authority to make these adjustments, however, inasmuch as this was a rather unique situation the committee felt the need to obtain special permission. This special permission was requested of the State committee who in turn referred the question to the Deputy Administrator, State and County Operations, Washington, D.C. In answer to the request the Deputy Administrator informed the county committee, through channels, that it needed no special permission to make these adjustments if they were deemed necessary.

After the various technical agencies of the U. S. Department of Agriculture recommended that continuous cropping of the entire Highwood Bench was the most feasible solution to the problem, the county committee adjusted conserving bases to zero or near zero on most farms within the boundaries of the Highwood Alkali Control Project Area. Bear in mind that the county ASC committee had several things to consider before making the decision to adjust these conserving bases; Namely, (1) the seriousness of tha alkaline situation and the desirable effect that continuously cropping the area might have in alleviating the alkaline build-up. (2) The increased production of small grains as a result of the conserving base reductions which could only add to the already large surpluses of these commodities. (3) As a result of the permissive increased production, the conomic advantage the Highwood Bench Area farmers would have over their neighbors and fellow producers that were farming beyond the boundaries of the project area and were harnessed with a conserving base-to-cropland ratio of near 50 percent.

The conserving base concept of the farm programs does not require specifically a summer fallow operation. In lieu of summer fallow a producer can seed small grain cover crops or perennial grass and legume cover on conserving base acreage as well as on any acreage diverted under the annual programs.

It is a commonly known fact that a unified community effort can accomplish more than can an individual effort or the efforts of various individuals working independently of one another. The greater the number behind a unified effort the greater the pressure that can be applied be it physical, economic, political, or otherwise. In the case of the Highwood Alkali Control Association one of the advantages of the community effort was in obtaining near unanimous participation in the project by the farmers in the area. Even though the results of the continuously cropping practice is not conclusive at this time it definitely would have had little effect on the overall objective had the participation by the producers in the affected area been less than near unanimous.

MONTANA BUREAU OF MINES AND GEOLOGY

BUTTE, MONTANA 59701

January 14, 1972

Mr. Van Haderlie
1845 - 36th Street
Missoula, Montana 59801

Dear Van:

Comments on Alkali Project--Highwood Bench

Here are a few quick comments regarding the questions you asked on the phone.

How Montana Bureau of Mines and Geology got involved

Dates and sequences of involvement:

(1) In May 1969, our agency received a letter from the Chouteau County Alkali Association briefly describing the problem and asking us to attend a meeting to be held sometime in May of that year.

(2) I was requested by our director to attend the meeting and evaluate the problem.

(3) I attended the meeting and felt that our agency could make a significant contribution to the hydrogeological aspects of the problem.

(4) Upon returning to Butte, I discussed the problem with the director and other members of the Ground-Water Division of the Bureau, and urged that we should get involved. Approval was granted (June 1969) and the Bureau of Mines and Geology agreed to help support the project. Every effort was to be made to secure some additional outside funds.

(5) A proposal was written and submitted to the Montana Joint Water Resources Research Center for the 1970-71 fiscal year. The project was approved.

(6) The Montana Bureau of Mines and Geology and the Water Resources Research Center has continued to support the project to date.

Extent of commitments (hydrogeological aspects):

(1) FY 1969-70

Montana Bureau of Mines and Geology		
Salaries and wages	$1,200	
Supplies	300	
Chemical analyses	800	
Per diem	800	
Travel	1,500	
Subtotal		$4,600
Chouteau County Alkali Association		
Supplies (approx.)	$ 250	
Travel (approx.)	150	
Subtotal		400
Total		$5,000

(2) FY 1970-71

Montana Bureau of Mines and Geology		
Salaries and wages	$2,500	
Supplies	100	
Chemical analyses	1,800	
Per diem	500	
Travel	800	
Subtotal		$5,700
Water Resources Research Center		
Salaries and wages	$3,675	
Supplies	635	
Travel	530	
Miscellaneous	250	
Subtotal		5,090
Chouteau County Alkali Association		
Supplies	$ 200	
Chemical analyses	300	
Travel	125	
Subtotal		625
Total		$11,415

(3) FY 1971-72

Montana Bureau of Mines and Geology		
Salaries and wages	$2,600	
Supplies	150	
Chemical analyses	1,500	
Per diem	900	
Travel	1,800	
Subtotal		$6,950
Water Resources Research Center		
Salaries and wages	$6,450	
Supplies	720	
Travel	350	
Miscellaneous	150	
Subtotal		7,670
Chouteau County Alkali Association		
Supplies	$ 175	
Chemical analyses	150	
Travel	300	
Subtotal		625
Total		$15,245
Total 3-year commitment		$31,660

Personal observation as to research approach

I think the approach used to initiate this project was very effective. First, the formation of a small local association with taxing powers organized the farmers, unified their efforts, and amplified the urgency of the problem. As a result, the Chouteau County Alkali Association was in a position to ask for research related directly to their problem rather than have an agency try to sell a project to them. The second important step was having a meeting at the proposed research area in which all agencies (local, state, and federal) were invited to discuss and evaluate the problem. This meeting and the field trip the following day essentially brought together the agencies that felt they could make a worthwhile contribution to the problem.

The interagency and/or interdepartmental approach to applied research problems can be very effective if it involves several areas of study and if the entire research group works together as a team and has a genuine interest in the problem. It is my feeling that the interagency approach to the saline-seep problem has worked very well; however, most other interagency or interdepartmental projects that I have been familiar with have not been too successful. Jealousy between individuals, financial problems, lack of interest and leadership, and failure to work together are the major reasons for poor cooperation.

Comments about agency tie-up, personnel involved, etc.

As far as the Montana Bureau of Mines and Geology is concerned, there has been very little interagency jealousy, and I feel that in general we have gotten along very well with the other agencies involved (ARS, MSU, and SCS). Working with highly qualified research personnel who are all extremely interested in the problem has made the project very challenging, interesting, and rewarding.

If you have any comments or questions, please give me a call.

Yours truly,

Marvin R. Miller

Marvin R. Miller
Hydrogeologist

Cooperative Extension Service
MONTANA STATE UNIVERSITY, U.S. DEPARTMENT OF AGRICULTURE, AND MONTANA COUNTIES COOPERATING
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59715

February 16, 1972

Mr. Van Haderlie
1845 36th St.
Missoula, MT 59801

Dear Van;

Enclosed is a statement about the Highwood Bench situation. I had intended getting a reply to you immediately after our conversation but misplaced the notes, then promptly forgot. I hope this information helps.

There is no way for me to be certain who did what, and when, in a very literal sense. However, I'm not sure that such exact detail is very important. I have tried to explain some of Extension's role and only part of roles of others.

Please keep in mind that I did not document many of the dates. Also, I am sure many other people should be mentioned as being involved. The best summary will be when this information plus that from several others can be put together.

I would like to see your final report, if that is permissible.

Sorry to be so slow!

Very truly yours,

Chuck

Charles M. Smith, Professor
Extension Soil Scientist

tv
Enc.

SALT PROBLEMS AND WATER SEEPAGE
Highwood Bench Area
South of Fort Benton, Montana

Following are observations of Charles M. Smith, Extension Soil Scientist, Cooperative Extension Service, Montana State University, Bozeman. This information pertains to how I saw recognition of the problem develop, and the agencies and individuals' involvement. The facts are not intended to be literally correct as to dates and perhaps sequence of events. Some of this is historical and may be of major interest only to me.

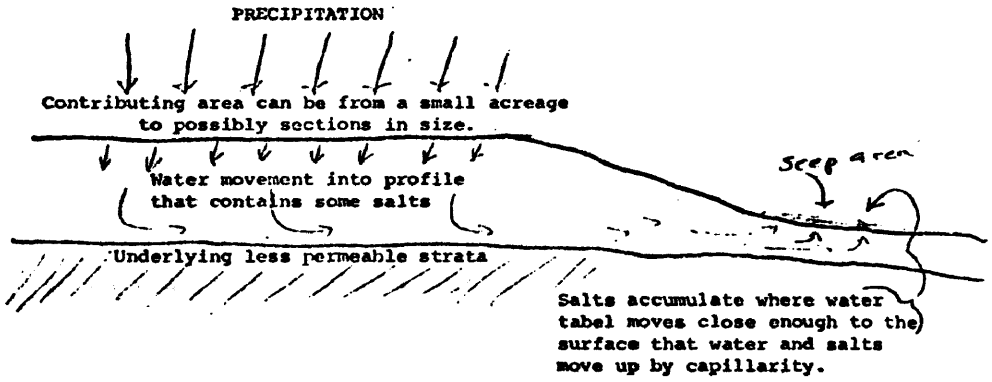
The first introduction I had to Montana was early in 1961. Our Extension Soils program that year included fertilizer test plots in the Fairfield and Conrad areas, along the Milk River, and in the Gallatin Valley. Travel took me past many areas with obvious salt problems on hillsides, in low areas and/or along drainages.

I asked many questions about these salt affected areas as to when they developed and whether they were spreading. In general, answers were in agreement that the "spots" were growing in size, had been in the process for several years, and seemed to be worse in dry years, especially those which followed wet years. Some of the easiest observable areas were near the highway between Vaughn and Conrad.

After consulting with Dr. Cliff Hyde, then Professor of Soils, MSU, my concerns were confirmed as he explained his theories of where the salts came from. Also, he confirmed why the areas "grew" in size especially in dry years and also especially when the dry years were after some rather wet years. Contrary to the opinion many people had (some still have) water movement in dryland soils is often appreciable. All that is needed is to

have more water in the root zone than the crops remove. The net effect is downward movement of water held at relatively high tension. This movement is speeded up by heavier additions in wet years and shows up worse in dry years because of greater evaporation of water with deposition of soluble salts at the soil surface.

Until the last 10 to 15 years it was thought by most scientists that to move salts through soils required large volumes of water movement at low water tensions (wet conditions). However, research has shown that the salt content of water moving at high tension can be higher in concentration. The following is a diagram of Dr. Hyde's version of the origin of salt problems.



(It is interesting that to date this is still the most plausible explanation of salt and seepage development on the Highwood Bench and other areas).

In working with County Agents, at farmer meetings, and in correspondence, I was often asked to explain development of salt areas and recommend a

remedy. Using Dr. Hyde's diagram as explanation, my recommendation was to try and prevent additional growth by digging an interceptor drain across the slope and slightly above the seep area. Even though water movement might be so slow that no drainage water would flow, salts could accumulate on the sides of the drain.

We started work with nitrogen fertilizer topdressing of winter wheat on the Highwood Bench in 1965 on the Tom Birkland farm working with Goerge Erickson, County Agent. The next year we had plots on Birkland and Glen Bramlette. During this period we observed the salt problems and expressed concern to research people that the problems were serious as attested to by the farmers of the area.

Researchers were aware the seepage problems existed and that reclamation in a dryland system would be slow if not impossible without additional water. At that time, about 1966, interest of researchers was only casual, primarily because of other commitments and/or lack of funds, and because not many would believe the seriousness of the problem.

The second year (1966) that I worked with N plots on the Bench, Ray Choriki also conducted plot work in that area. Because there were so many other areas of Montana needing N work on dryland grain, Ray and I agreed that he would work the Bench and Extension's efforts would move elsewhere, except for the assistance to Ray given by Erickson.

During 1967 and after, my contacts continued with the Bench area through cooperative planning of experiments with Choriki. and discussions with Ernie Ahrendes and Dr. Roy Huffman, V. Pres. for Research, MSU. Both were from the Highwood area and had great interest and concern about the buildup of salts in the soils.

During the period prior to 1969, local farmers and SCS were working to stimulate interest in their problems. I do not have details about the specific activities. Ray Choriki had been also involved in conversations with Norris Hanford, Glen Bramlette, Fred Booth, and undoubtedly other farmers concerning the salt buildup.

Because of suggestions by many, farmers of the area got together and asked for help. I am sure several whom I was not aware of had urged grass roots action. I am aware that both Ray and I urged Norris and others to move ahead and ask for a meeting involving various agencies.

A meeting was held in the Bozeman Federal Building which involved farmers from the Highwood Bench, SCS personnel from Fort Benton and Bozeman, Cooperative Extension Service, Agricultural Experiment Station both from Moccasin and Bozeman, and some others. Various individuals reported on their ideas about the origin of saline seep problems. Some felt the water originated in the Highwood Mountains. Others assumed it was mostly of local origin. Some SCS personnel said that interceptor drains would not work to relieve the problem. They said some had been installed with no value from them. (Although I had not visited nearly all of the bench, I hadn't seen any interceptors.)

The appearance of the problem was nearly the same as we had in southern Iowa where the Kansan till underlies a loess mantle. Water goes through the loess and moves downslope until it is close enough to the surface to cause a seepage area. In the Highwood Bench area, glacial till overlies shale of varying depths but the effect appears to be comparable with the Iowa situation where we dug with a spade many tile lines to relieve the problem. Anyway, the similarity of problems was sufficient to raise questions about similarity of solution, even though amount of precipitation was much greater in Iowa and the seep areas there were not salty.

As a result of the Bozeman meeting, Wendell Thacker of SCS, myself representing Extension and Experiment Station, and a representative of another agency were charged with the responsibility to develop a situation statement. This we did.

Through efforts of the Alkali Association (I do not have the date when it was formally organized), Chouteau County SCS and Extension, a tour and conference were planned for the Highwood Bench area. Invitations were extended to representatives of many agencies and included ARS at the Northern Great Plains Research Center, Mandan, North Dakota, who were initiating research on saline-seepage areas in N.D. The tour was enlightening to all concerned and helped to clarify the problem.

While on tour we were shown surface drains. They were relief type and not interceptor drains, as had been indicated at the Bozeman meeting. Whether or not interceptors will work on certain of the problem areas has not been determined. Obviously surface or tile interceptors will work if the water conducting material is not too deep. After considerable amount of drilling, Dr. Paul Brown feels some can be intercepted and some perhaps not. Most effective, however, would be to reduce water in the contributing area, rather than drainage of already affected areas.

Prior to the tour, and after, we tried (mostly unsuccessfully) to get administrators in the Agricultural Experiment Station and Plant & Soil Science Department to place a higher priority on the seepage problems. Again, some of us urged Norris and others to go directly to the administration with requests for help, in addition to talking with us, to try and get more research funds and personnel for the problem area. Also, we wanted Dr. Joe Asleson, Dean of Agriculture, Dr. Erhardt Hehn, then Head of Plant and Soil Science , and Carl Carlson, ARS, Beltsville, to view the problem and develop a better understanding of it. This was accomplished at a later date.

Without question, the most effective moves they, the association, made for getting action underway were to: (1) organize an alkali association and agree to tax themselves to show they were serious in wanting to get their problems solved, (2) work with several agencies including research, action, and educational agencies, (3) go direct to administrators after convincing others of the need, (4) continue to be agressive.

After the tour, which involved ARS from Mandan, we had a meeting at the SCS offices in the Rocky Mountain Bldg. in Great Falls. It was agreed by those present that a major research effort was needed. ARS personnel from Mandan indicated they would be interested in conducting some research on the Bench if no one from Montana would. Also, it was agreed that someone should be named as research coordinator.

Probably because I was present and had been designated by the Dean to represent both Extension and Experiment Stations I was asked to be coordinator of research. However, because of too many commitments already and the nature of the research needed being so closely tied to water movement in soils, I suggested Dr. Hayden Ferguson. At that date he had not seen the problem areas. However, we had discussed the problems and he was interested if some funds could be made available to provide a reasonable chance for accomplishment. Others agreed that Hayden should be asked, and he accepted.

The first year of plot work having objectives on seepage included two experiments which Ray Choriki and I designed for the purpose of determining whether crop management and fertilizers would affect water use. One was a large experiment on Bramlette's and Booth's farms to evaluate different cropping systems. One system was intended to simulate the effects of allowing volunteer grain and weeds to grow in the spring and early summer. The reason for this treatment was to use water during theearly part of the

growing season, then destroy that crop early enough to allow recharge of the soil surface so fall seedings of winter wheat could be successful. This kind of treatment in theory, could use water and still permit summerfallow if necessary. Also, recrop and various combination programs were included.

This treatment has never been handled as the design specified mainly because of availability of equipment at the right time, and people to do the work. It is hoped that improvements in operations will be possible if additional funding is acquired. There is no way to always get treatments installed at optimum times unless there is adequate funding for enough equipment and personnel. Hopefully--additional funding will be realized in 1972 or 1973 from Federal sources.

The other experiment was on grass to determine the water use resulting from adequate rates of N fertilizer. This was stimulated by the apparent fact that seepage problems became worse during 10 years of soil bank grass. Some of us felt that if the grass had been adequately fertilized and harvested so not to damage subsequent growth, water use should have been sufficient to relieve or stop the problem.

Hayden Ferguson and Marvin Miller began work with wells and water use and movement. Then late in 1970 and in 1971, ARS involvement became greater from the personnel viewpoint with Paul Brown including work on the Bench as a specific part of his program.

Clair Clark has played a key role over the years of program development and especially in assisting with descriptions of borings and research sites. Wendell Thacker worked hard to organize a symposium in Great Falls where Experiment Station, ARS, Extension and SCS personnel contributed papers. Also, Oscar Peterson and several others have worked long hours. The ASCS Committee has helped in their way by getting special consideration for more

allowable acreages of grain so summerfallowed acreages could be reduced. From my own viewpoint, it seemed hopeless for a long time that we could shake loose funds or people. However, by being persistent, by getting "seed" money from the Alkali Association, and by getting some funding from ARS in Beltsville, additional input from MSU and ARS in Montana has been realized.

Currently, all the above agencies are deeply involved in trying to solve the problems. However, answers are wanted before research is done. Because of this, several meetings are being held each year to update farmers of the area on progress of research and to exchange experiences.

The contributions by farmers of that area who do research of their own are not to be ignored. Through cooperation of many people and agencies, the problems can be solved.

Ft. Benton, Montana
January 4, 1972

Dear Van,

Here is some material you may find useful in relation to the alkali problem in Chouteau County.

Im sending some ASCS photos of a field showing the progression of the seeped area over a period of several years. The particular data is given below.

	1930	1956	1966	1969
Cropland acres	113	107.7	102.2	66.3
Alkali acres	0	5.3	10.3	46.7

Economic loss of land - @ $200.00/acre - $9340.00
Annual loss in food production @ 20 bu/ac/yr - 934 bu.
Annual loss in value of food @ $1.20/bu. -$1120.80

County-wide estimated loss at the end of 1971:
Land-----10,000 acres
Economic-$2,000,000
Food-----200,000bu/yr
Value----$240,000 per year

I hope this will give some indication of the extent and seriousness of the alkali problem.

Sincerely,

Oscar O. Pederson

Oscar Pederson

4930-9th Ave. South
Great Falls, Mt. 59405
January 6, 1972

Mr. Van Haderlie
University of Montana
Missoula, Montana

Dear Van:

Apparently, saline seeps began to appear within a few years after summer fallow became a regular practice in Montana. Hi Warden, the first District Conservationist at Fort Benton, was very much concerned about the problem. He spent a lot of time talking to farmers in the Highwood area when he was there in the 40's and early 50's.

But no organized plan of action was developed; local people were not stimulated to solve their problem. SCS just went on functioning in the same manner -- answering individual requests. So far as I know, no attempt was made to get group action at this time.

My first contact with farmers concerned about saline seep on fallowed land was in the Denton-Coffee Creek area in Fergus County early in 1967. Several operators had asked for assistance. On one of my visits to Fergus County Metro Karaffa and I contacted several of them. We discussed the problem with them at considerable length. Metro and I continued our discussion during that visit and several ensuing trips I made to Fergus County. Together we mapped out a strategy which we thought might get some action started.

I believe I first observed the problem in Chouteau County in May 1968. Oscar Pederson, District Conservationist, and I visited the farm of Jim Spivak at Geraldine. We also looked at several farms in the Highwood area, particularly Tom Wharram's. Tom, Oscar and I sat in the pickup looking at some of the worst areas on Tom's farm and discussed how it could be solved. We dwelt on the use of continuous cropping to solve the problem.

Later that month, back in Bozeman, I visited about the problem with Art Shaw, Extension Agronomist. He was aware of saline seep. I am sure he had never given much thought about anything that might be done to solve it.

I suggested that we outline a plan of action. My plan included using a TAP (Technical Action Panel) approach to solving this problem.

Most agency employees were not enthusiastic about TAP. I felt the theory behind it was sound; we just needed to find out how to make it work.

I felt the main weakness in TAP was lack of liaison to keep the system going once a problem had been identified. A county committee would determine they could not solve a given problem, write it up and send it to the State TAP Committee requesting their assistance. The

State Committee would agree that it was serious, recommend that each agency work on it, pass a motion and adjourn. At succeeding meetings, unless someone pressed the issue, the problem seldom received further consideration.

The point is that someone has to keep the thing alive. Call him liaison, coordinator, or whatever, he has to keep picking away at this problem. He has to keep nudging people, keep looking for the right button to push to keep moving toward a solution.

Another thing that is needed is administrative sanction and direction, so that agency employees know that multi-agency problem solving is a part of their job responsibility.

After much discussion, Art and I drafted a letter to Oscar Pederson and George Erickson, Chouteau County Extension Agent, suggesting the plan of action using the TAP approach. In addition, we drafted a questionnaire to send to farmers to get facts and trends regarding saline seep development.

The questionnaire was effective in stimulating interest and action by private individuals and groups. When the Chouteau County CRD sent the State CRD Committee their request for assistance in solving saline seep it was signed by several local farm organizations and committees.

I kept in touch with the State Committee and eventually suggested that a group of agency people be called together to discuss the problem. Eighteen agency employees and three farmers attended this meeting. The attendance of these three farmers deserves special mention.

They called me one day from Ray Choriki's office, I was frankly surprised that farmers had heard about the meeting and were sufficiently interested to drive all the way to Bozeman to attend. I assured him they were welcome.

The three farmers, as you know, were Norris Hanford, Fred Booth, and Glen Bramlette.

I still wonder if anything much would have happened as a result of that meeting had it not been for their presence. They stated their case very ably and convincingly.

The thing which they added which no agency person could have supplied was the urgency of the problem from the farmer's standpoint - the conviction that farmers were concerned, that they did want to do something about the problem, that they did want help. All agency people respond to this kind of sincere appeal.

Four months passed after this meeting before a plan of action was substantially jelled. I conferred frequently with Dr. C. M. Smith, Extension Soil Scientist. He was working hard to get Montana State University committed to action. I think he deserves a lot of credit for bringing this about.

After two field tours of Highwood Bench by agency people, a research project was set up, with Dr. Hayden Ferguson as research coordinator.

Even before the research project was born, farmers formed the Highwood Alkali Association. Their function, I feel, has been significant to every bit of progress that has been made, and often essential.

Late in 1970, I discussed with Oscar Pederson and Tom Wharram my concern that action to control saline seep might proceed too slowly. I was afraid farmers might neglect to take the substantial remedial measures already recognized while they waited for research to show them the "best" way.

We discussed the need for a workshop to agree upon the best methods now available and disseminate this information to the public. Our object was to get some kind of saline seep control practices put in use at once. Systems could be refined later with better information from research and experience. But we felt a lot of degradation could be avoided by applying practices which could be advocated at that time. We felt this was needed wherever the problem occurred in Montana, not just in Chouteau County.

The scientists involved in the research were not enthusiastic about the idea. Again it was the farmers who carried the day.

A meeting was arranged between members of the Alkali Association and agency representatives to discuss need for a workshop. The farmers were enthusiastic and the research scientists agreed.

My observation is that when a group of sincere farmers and ranchers (or other private citizens) go to work on something, people listen. Grass roots approach is far stronger than the average citizen realizes before he gets involved in a program of this kind.

The workshop was a success. About 300 attended. Later four more one-day workshops were held across the state. Between them, saline seep became generally understood by Montanans and received a lot of publicity outside the state.

Agency relations in the saline seep project overall have been good. Of course there have been instances of disagreement, jealousy and bias, but none which have proved serious.

The differences between agencies are healthy and sharpen the focus on the problem. Solving them is beneficial to a perspective of the problem and increases appreciation of each agency's dependence on the others.

The one overriding lesson to be learned from this project, I feel, is the importance of the involvement of the private sector. Many of the projects which failed in the past could have succeeded, I believe, if agency people had obtained involvement of local people in the early

stages. The time to get local people involved is as soon as you start people working on the problem. This happened in Chouteau County and is a major reason why progress is being made.

Sincerely,

Wendell Thacker

Wendell Thacker
Area Conservationist, SCS